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Original Contributions.

A MICROSCOPIC STUDY OF CEMENTS.

BY GEO. C. POUNDSTONE, D.D.S., CHICAGO. READ BEFORE THE ILLINOIS STATE DENTAL SOCIETY, AT PEORIA, MAY 10-12, 1904.

The cement problem has occupied the attention of the dental profession more or less for the past half century, but its solution has been left almost entirely in the hands of the manufacturers. They have made many attempts and have in some instances been fairly successful, but they have not as yet produced the ideal.

What is the ideal cement? For the purpose of setting inlays, which is the theme of this paper, the following points seem to be of extreme importance: 1st. It must be capable of being compressed into a very thin film—at least as thin as the matrix used. 2nd. It must have unusually adhesive qualities. 3rd. It must neither expand nor contract. 4th. It must be impervious to moisture.

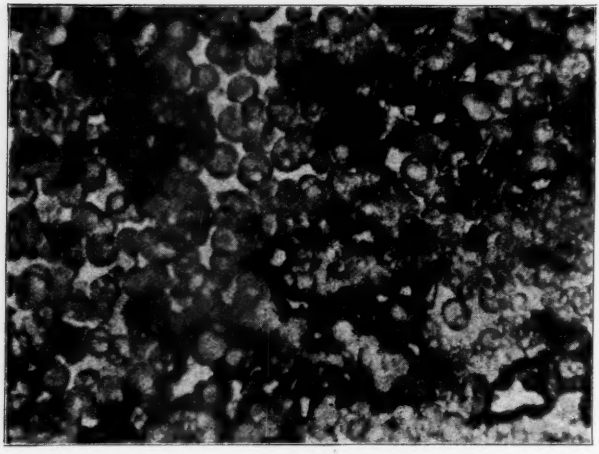
In giving the results of my observations and experiments the different cements will be designated by numbers rather than by their commercial names, as it is not my purpose to in any way injure the reputation of any of the cements tested, nor have I an object in recommending any particular brand.

The first series of observations was made for the purpose of determining the general appearance of the powders, the shapes and sizes of the granules, and their relative proportions in the mass. Microscopic slides were made from the different powders mixed with glycerin, the glycerin being used instead of the cement liquid to avoid chemical action.

In the second series slides were made from the various powders, each mixed with its corresponding cement liquid to a creamy consistency, and cover-glasses were subjected to pressure in order to

get as thin a film as possible. These slides were then studied with the microscope, the measurements being made with the micrometer. Twenty-five microns are approximately the equivalent of 1-1000 of an inch.

No. 1 in Glycerin.—This powder is made up of three classes of granules: first, the large ones which are few in number and very irregular in shape, with rough, jagged edges. In size these granules vary from thirty to forty microns in diameter, while a few large flat ones measure as high as fifty-six microns. The main bulk of the powder is made up of granules irregular in shape and size, ranging



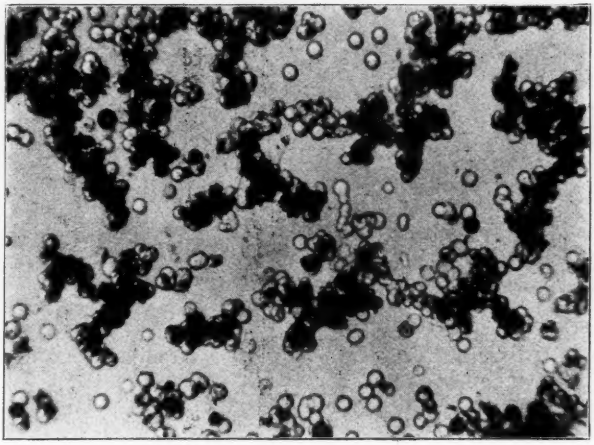
Cement No. 1 after setting four weeks between slide and cover glass.

from sixteen to thirty microns in diameter, and mixed with these is a large amount of very fine powder, the granules of which are more uniform in size and shape and appear to be of a different substance from that of the larger granules.

When mixed with the cement liquid a change takes place in a few minutes. The fine powder is dissolved by the liquid and in a short time small bubbles appear, which seem to arise from the dissolving particles of fine powder. These bubbles keep increasing in size and number for two or three days, after which there is little or no change. The medium and large-sized granules seem to undergo little change other than a slight diminution in size, the sharp

jagged edges becoming smooth and rounded. At no time do bubbles seem to arise from the larger granules.

No. 2 in Glycerin.—This is a very evenly ground powder, the average size of the granules forming the bulk of the mass being from ten to fifteen microns in diameter. A few granules measure as high as twenty, and a very few reached twenty-seven microns. They are uniformly oval in shape, with no rough or jagged edges, and are of a light yellowish color, semi-transparent. Occasionally there will be found large, flat, irregular scalelike pieces almost transparent, measuring as high as fifty microns in diameter. These



Cement No. 2 after setting four weeks between slide and cover glass.

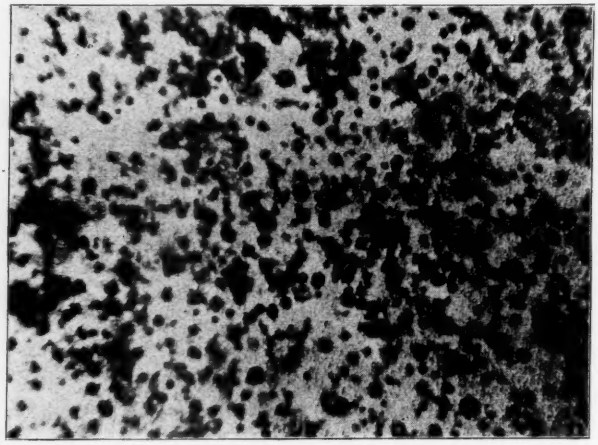
appear to be flakes that have split off from larger pieces in the grinding. Intermixed with the granules already described is a comparatively small amount of fine powder which appears to be of the same material as the larger granules.

When mixed with the cement liquid very little change is noticed in the first ten minutes except a gradual fading away of the smaller particles of the powder in its union with the liquid, which goes on until nearly all of the fine powder has disappeared. The medium-sized and large granules tend to group themselves into clusters or chains and show the effect of the action of the liquid by their diminished size.

A few bubbles were present when the slides were first examined, but no subsequent change was noted, which inclines me to the belief that they were bubbles of air incorporated into the mass in the mixing.

After two or three days some slides from this cement show beautiful forms of crystallization, which keep on forming for more than a week, while other slides prepared in the same way show no signs of crystallization whatever.

No. 3 in Glycerin.—This powder is made up of a comparatively few large granules of irregular shapes, many of them with rough



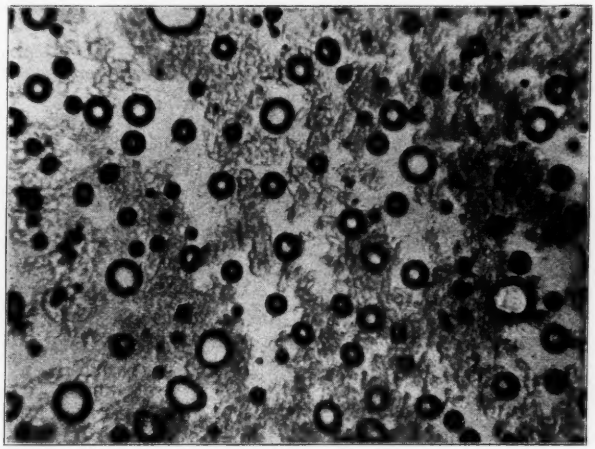
Cement No. 3 after setting three days between slide and cover glass.

jagged edges. The largest of these granules measure as high as forty microns in diameter. Then there is about an equal number of irregular granules from twelve to eighteen microns in diameter, and a large amount of fine powder which to all appearances is of a different substance from that of the larger granules.

When the powder is mixed with the cement liquid, within five minutes many bubbles appear, arising from the finer particles of the powder. These bubbles gradually increase in size and number until at the end of twelve hours they have covered a large portion of the field. The area between the bubbles has by this time a grayish mottled appearance. At the end of twenty-four hours many of the bubbles have combined, forming large irregular spaces. The

mottled appearance is now much darker, some portions being almost entirely opaque. Many of the medium-sized and larger granules still remain without any apparent change except a slight diminution in size. There is a constant change in this cement for at least ten days. The spaces formed by the bubbles become more and more irregular in shape. Some crystallization is noticed after three or four days in many of the slides, while others show none at all.

No. 4 in Glycerin.—This powder is made up of a few large irregular, smooth-edged granules, the largest of which measure as high as forty-six microns in diameter. Then there is a goodly number of



Cement No. 6 after setting three days between slide and cover glass.

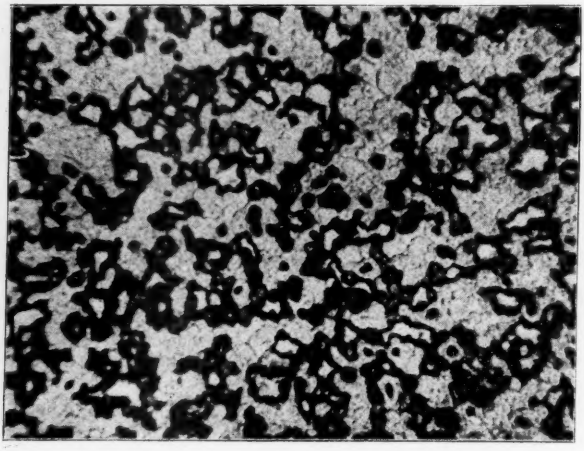
granules of much more regular prismatic form, ranging from eighteen to twenty-two microns, and a large amount of fine powder, the particles of which are very irregular in shape and size.

When mixed with the cement liquid there is at first little change in appearance. A few bubbles appear within the first fifteen minutes, but they do not increase in number. Chemical action seems to take place very slowly, for at the end of an hour nearly all of the fine powder is still visible, and after twenty-four hours only the finest particles have disappeared. The small bubbles that appear at first remain as bubbles in the mass.

No. 5 in Glycerin.—This powder is composed of a very few large oval, smooth-edged granules, the largest of which measure

as high as forty-six microns in diameter. The bulk of the powder is composed of oval granules ranging in size from six to fifteen microns in diameter. There is also a small amount of fine powder, the granules of which are very similar in shape and appearance to the larger ones.

When mixed with the cement liquid a few bubbles appear within the first five minutes, increasing until they are rather numerous, but they show little tendency to run together and form the irregular spaces noted in No. 3, and in no case do the bubbles seem to come from the larger granules. There seems to be a slight ten-



Cement No. 6 after setting four weeks between slide and cover glass.

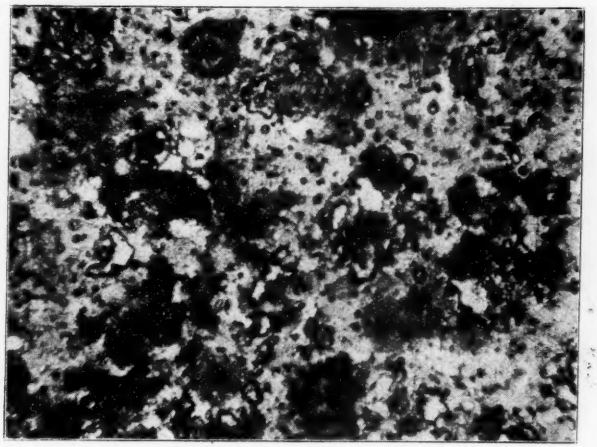
dency on the part of the granules to group themselves into clusters in setting, as was noted in No. 2.

No. 6 in Glycerin.—This powder is composed of a very few large, irregular rough-edged granules, varying in size up to fifty-six microns in diameter. There are a few medium-sized granules from twelve to eighteen microns in diameter, but the greater portion of the mass is made up of extremely fine flourlike powder of uniformly oval granules less than two microns in diameter. This fine powder appears to be of a different material from that of the larger granules.

When mixed with the cement liquid almost immediately a large number of small bubbles appear, arising from the finer particles

of the powder. The bubbles increase in size and number, uniting with each other when coming into contact, until they cover almost one-third of the field. They remain as distinct circular bubbles for a week or ten days, when they begin to assume irregular forms, and by the end of the second week some show of crystallization begins to be apparent around the edges of the bubbles. There is little or no apparent change in the larger granules.

No. 7 in Glycerin.—This powder is made up of a small number of large granules measuring from twenty-five to thirty-five microns in diameter. They are somewhat irregular in shape, with edges



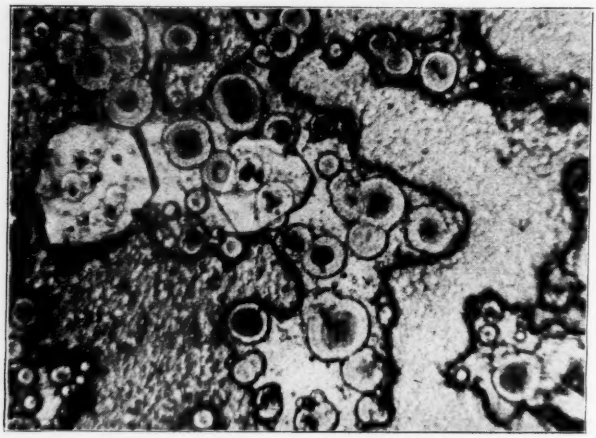
Cement No. 7 after setting three days between slide and cover glass.

smooth and rounded. The main bulk of the powder is made up of granules ranging in size from five to fifteen microns in diameter, and in other respects resembling the large granules. There is a small amount of fine powder, the granules of which are more regularly oval in shape. All the granules of this powder are of a light yellowish color and are semi-transparent.

When mixed with the cement liquid the fine powder soon begins to disappear, and within five minutes bubbles start to form about the disappearing small granules, but not around the larger ones. These bubbles increase in size and number until they are rather numerous. By the end of twenty-four hours nearly all of

the fine powder has united with the liquid. At this time many translucent circular areas appear which in three or four days begin to show crystallization, with crystals all radiating from a center. By the end of a week many of the bubbles have gone together, forming large irregular spaces, and the entire mass has taken on a grayish mottled appearance. At the end of two weeks some of the largest granules are still visible, the open spaces have become more irregular, and the whole mass is much more opaque in its appearance.

No. 8 in Glycerin.—This is a uniformly ground powder made



Cement No. 9 after setting three days between slide and cover glass.

up of a large proportion of oval smooth-edged granules of an average diameter of about twelve microns. There are a very few large granules, the largest being not over twenty-seven microns in diameter, and among these is a small amount of very fine powder, which greatly resembles No. 2.

When mixed with the cement liquid the fine powder soon unites with it. The larger granules have a decided tendency to arrange themselves into groups or chains, and a considerable number of bubbles appears in the portions of the field between the groups of granules. After a week there is a large amount of crystallization, with the crystals radiating from the center. The bubbles have

by this time changed into large irregular spaces and the slide has a grayish mottled appearance much the same as that noted in No. 7.

No. 9 in Glycerin.—This powder is made up of a very few large irregular granules, some of which measure as high as forty-five microns in diameter, a few medium-sized ones ranging from fifteen to twenty microns, and a large amount of fine powder, the granules of which are almost opaque, giving the entire mass a cloudy appearance. The larger granules are not translucent to such a degree in this powder as in the others tested.

When mixed with the cement liquid the mass is at first almost opaque, but in half an hour there is an apparent clearing and the granules are plainly seen, but at no time do they become as clear as those of the other powders tested. There are very few bubbles, but after a few days some large open spaces appear. There is a decided tendency in this cement while being mixed to draw away from the glass as water draws away from an oily surface, and the same is true when mixed on ground glass. By the end of a week crystallization has taken place, but in this case there are some crystals that are square and somewhat irregularly arranged in addition to the definite radiating forms noticed in some other cements.

To summarize the results of the foregoing observations for a closer comparative study we have the following table:

No.	Large Granules.			Medium Granules.			Fine Powder.		Bubbles.
	Relative Number.	Form.	Size of Largest.	Relative Number.	Form	Average Size.	Relative Amount.	Form of Granules.	
1	Few	Very irreg.	56	Many	Irreg.	16–30	Large	Oval	Few
2	Very few	Oval	27	Very many	Oval	10–15	Small	Oval	Few
3	Few	Irreg.	40	Few	Irreg.	12–18	Large	Oval	Very many
4	Few	Irreg.	46	Many	Reg.	18–22	Large	Irreg.	Very few
5	Very few	Oval	46	Many	Oval	6–15	Small	Oval	Many
6	Very few	Irreg.	56	Few	Irreg.	12–18	Very large	Oval	Many
7	Few	Irreg.	35	Many	Irreg.	8–15	Small	Oval	Many
8	Very few	Oval	27	Very many	Oval	10-15	Small	Oval	Few
9	Very few	Irreg.	45	Few	Irreg.	15–20	Very large	Irreg.	Very few

From the measurements already obtained it would seem that many of the cements tested are unfit for the purpose of setting inlays, or that if they are used the thickness of the matrix would have to be governed by the size of the largest granules. As has been noted in the descriptions of the various powders, many of the larger granules are very irregular or flat in shape, and in microscopic examinations they present the flat side to view. It is also quite evident that many if not all of these granules undergo some change upon their surfaces when coming in contact with the liquid, the result of which is a diminution in their size, so another series of experiments was made to determine the exact thickness of these granules.

Two cover-glasses were accurately measured in the micrometer, a mix of cement of the proper consistency for setting an inlay was made and placed between them, and they were then subjected to a pressure of twenty-five pounds for fifteen minutes. This is the maximum pressure that would ever be brought by the fingers upon an inlay, and is far beyond that which most operators would use, careful tests proving that from ten to fifteen pounds is all that can generally be exerted, and that for not more than two or three minutes at a time. At the end of fifteen minutes the pressure was removed and the cover-glasses with the film of cement between them were measured. They were again measured in twenty-four hours to determine the expansion, if any, and again in seventy-two hours with the following results:

No.	Thickness of Cement After Setting 15 Minutes Under 25 Pounds Pressure.	Thickness After 24 Hours (Microns).	Expansion (Microns).	Change After Setting 72 Hours.
1	30	34	4	No further change.
2	27	27	0	No further change.
3	19	20	1	No further change.
4	31	41	10	No further change.
5	28	34	6	Slight increase in expansion.
6	24	25	1	Slight increase in expansion.
7	21	21	0	Slight expansion.
8	31	35	4	Slight increase in expansion.
9	34	46	12	No further change.

As twenty-five microns is approximately 1-1000 of an inch, this would seem to indicate that only three of those tested would allow the inlay to go to the proper position if a 1-1000 inch matrix were used, and that under twenty-five pounds pressure.

The expansion of these thin films of cement is worthy of careful consideration. For example, No. 4 with an expansion of ten microns in a thickness of thirty-one explains perhaps why the cement shows so much more around the margin of the inlay after a few days than when first put in. The same would be true of No. 9 and also of Nos. 1, 5 and 8, which show decidedly too much expansion for inlay work. Then by referring to the first table we find that No. 3, while it spreads out into a thin film and shows very little expansion, has many bubbles which become spaces and must permit the secretions of the mouth to thoroughly permeate it. Nos. 6 and 7 are open to the same objections.

In the foregoing tests No. 2 seems to come the nearest to fulfilling the requirements for an inlay cement, but among inlay workers this particular cement has been condemned because it would not stick. This may be accounted for possibly by the peculiar grouping of the granules in setting and leaving large areas with insufficient support. This same characteristic is noticeable in Nos. 5 and 8.

It would be but reasonable to suppose that cements which contain bubbles and open spaces would sooner or later be penetrated by the fluids of the mouth, but to more certainly demonstrate this another series of tests was made. Cover-glasses were thoroughly cleansed and a mix of cement placed between each pair. They were carefully pressed together until the cement had set, when they were put into a solution of eosin in water and placed in the incubator and kept at body temperature. I shall not give the results of the staining, for within forty-eight hours all of the cover glasses had separated. This would show conclusively the folly of attempting to set an inlay with a glazed surface. The next attempt was made with cover-glasses thoroughly etched, and this time we had better success. The results of this test can best be shown by the illustrations.

The results so far as I have gone have been pretty generally bad, but I have not gone far enough. I am confident that there are good features in the cements tested, but unfortunately no one cement seems to possess enough of them to make a perfect product. I believe that by a careful and systematic process of blending different powders, and possibly liquids, too, we shall be able to greatly improve upon anything on the market now. By a careful

series of tests and experiments with mixed powders we may be able to overcome the expansion of the one, the bubbling of another, and the lack of adhesiveness in another. If members of the profession will take up the study of cements from the scientific standpoint and not for the sole purpose of getting some new product on the market, I am confident that we may look forward to the day when we can cement inlays into teeth with the certainty that they will stay there for a reasonable time at least.

Dr. G. V. Black, Chicago: The series of studies introduced by Dr. Poundstone is very important and may lead to great improvements in inlay work. It opens a way that is different from those pursued heretofore in the study of cements—a way that is beset with difficulties—but it gives us another key by which we may be enabled to unlock the mysteries that surround the action of cements.

If inlays fitted the cavities within the thousandth of an inch we would not be able to get them into place with a film of most of the cements in use, as the granules are too large. That is one thing to be remedied, and it can be done by lixiviation, a washing out and separating process, and probably in a more simple way in the future. This condition shows plainly that our inlays are shrinking, perhaps more than we think, and the larger the inlay the worse the trouble, for the shrinkage will be in proportion.

It is my experience that a cement which sets under pressure will expand greatly when the pressure is removed. That is characteristic of cement, and it has come out prominently in these tests. It gives the explanation of the fact that the cement forces out the inlay, and is the reason why we have such bad borders occasionally. Although the inlay when first put in seems to fit very nicely, afterward the irregularity can be felt with the finger or instrument, and sometimes it is visible.

You will understand that easily in the next experiment—the running of color in between the glass slides cemented together, for a cement that will not remain perfect for weeks between coverglasses will not remain perfect in the mouth. The fluid will penetrate between inlay and cement as it does between glass and cement. In other words, the cement loosens up from the glass and we have every reason for believing that it is the same with porcelain. If the glass is etched it loosens up a little more slowly.

There is a difference in cements, for in some the color will run through the cement, and in others it runs beside it. How many of you have found cements that, when a residue is left upon your slab, porcelain or glass, could not be loosened up by putting the slab in water for a considerable time? It all comes loose.

This goes back to a principle that I developed rather fully in 1859 and again in 1874. Most substances have a peculiar affinity for liquids of various kinds. For instance, dip a glass rod into water and it will come out wet, as the water adheres to the surface of the glass rod more strongly than the molecules of water adhere to each other. Dip the same rod into oil and the latter will remove the water, because oil has a greater affinity for glass than has water. In the case of the cement on the slab the water has the greater affinity for the glass or porcelain and so detaches the cement and attaches itself. Hence it runs in between the cement and the cover-glasses even when they are etched. Possibly this may be overcome by careful study, as we may be able to determine those features of cements that contribute to cohesion, and study the actual class of granules from which this is derived. Perhaps the liquid carries with it the element that causes the trouble, or acquires it afterward. Cement liquids are very treacherous, and it will be the work of the future to explain all this. Men have been at work on these problems for years, but sometimes the novice stumbles onto an important principle after the scientist has failed.

The polariscopic study probably will be important in the future. A feature shown prominently by the polariscope is that cements require a good deal of time, at least ten days, to become fixed. Crystallization is slow, and when the cement is hard and has apparently set completely it is far from being so. Day after day the changes going on there are very apparent. We may also be able to improve on our photographs by using a lens with a long, low angle so as to give penetration.

Dr. J. E. Hinkins, Chicago: From this paper it is evident that even up to the present time we have not known the composition of the so-called zinc oxyphosphate cements. Hence we chose a number of standard oxyphosphates as a good basis for our research. We also made up samples from pure zinc oxid and glacial phosphoric acid. Upon studying the properties of these we found them

to consist of a mixture of zinc oxid, or phosphoric acid, and zinc phosphate. Furthermore, the term zinc oxyphosphate is a misnomer, as on looking through the chemical literature we find no such substance described. The phosphoric acid used in cements is perhaps a mixture of meta, pyro and ortho or ordinary phosphoric acids, with the latter in large excess. Meta and pyrophosphoric acids easily take up water, and especially upon heating, to form the ortho acid. In forming the cements the zinc salt is very nearly pure zinc orthophosphate, as our analyses show.

Upon mixing zinc oxid and glacial phosphoric acid a chemical action takes place with the formation of zinc phosphate, and any excess of either zinc oxid or phosphoric acid remains inclosed in the mass. We have made up cements with an excess of zinc oxid, and also some with an excess of phosphoric acid. The former solidify much more quickly than the latter. These were made up in about the same way as in making fillings in the teeth, and have about the same properties. When the phosphoric acid acts upon the zinc oxid a rather large amount of heat is generated: $3ZnO + 2H_3PO_4 + H_2O = Zn_3(PO_4)_2.4H_2O$. Zinc oxid will absorb carbon dioxid from the atmosphere and from the carbonate of zinc, which by the action of the acid gives off the gas or effervescence.

The glacial phosphoric acid of commerce has a rather large amount of water in it, and hence we have the extra molecule of water for the above reaction. When one of these cements is dissolved in HCl, and this solution is made slightly alkaline with ammonia, zinc phosphate is precipitated as a finely crystalline powder, having all the properties of normal zinc phosphate described in Dammer, the reference book of inorganic chemistry. It is easily soluble in even dilute strong acids, such as hydrochloric and nitric, and somewhat soluble in concentrated weak acids, as acetic, butyric, etc. Concentrated ammonia dissolves the substance to some extent, but in dilute ammonia or dilute weak acids it is very insoluble. Hence the above is an easy method of separating the zinc phosphate from the rest of the cement, for zinc oxid, or of course phosphoric acid, would not be precipitated under these conditions.

The best cement we can hope to obtain is a saturated chemical reaction in which all of the ions are used up in both compounds.

It is evident that in setting an inlay all of the large granules are forced to the bottom of the cavity and must remain there, owing to their size, they being greater in diameter than the distance from the inlay to the wall of the cavity. This leaves the margins filled mostly with the liquid part of the cement. Chemical analysis proves that whenever there is an excess of either acid or powder this excess is more soluble and will necessarily be the first to dissolve out. Chemically each substance unites with every other in definite proportions, hence when there is an excess of one it is held in solution mechanically. An excess of acid is undoubtedly the cause of the clear spaces in the slides shown, but were there no excess the cement would be so thick as to prevent forcing an inlay to place.

The common test of placing a pellet of cement in red ink and finding no penetration is not a fair test, because the weakest point is the joint between the cement and the wall of the cavity, and the capillary attraction, the osmotic and electrolytic forces, are greater than the adhesive properties of the cement, because the essayist has demonstrated that the cements are not homogenous.

Dr. Hermann Prinz, St. Louis (by invitation): This very interesting paper recalls to my mind some experiments which I carried out some years ago. In undertaking a study of the cements of the oxyphosphate group I would, as Dr. Hinkins has outlined, commence at the very beginning. The whole question of the chemical nature of the so-called oxyphosphate of zinc cements is an extremely simple one. No matter what brand of oxyphosphate cement is employed, the prime ingredients are always the same, namely, a pure vitrified oxid of zinc and a liquid phosphoric acid of the right consistency. The oxid of zinc should be vitrified at a high temperature for many hours or even days to remove all traces of nitric acid, finely powdered and bolted through cloth, and rapidly bottled in small containers to prevent absorption of carbonic acid from the air.

The appearance of bubbles during the setting of the cement is mainly due to this absorbed carbonic acid gas driven off by the stronger phosphoric acid, or sometimes they are air bubbles. The fluid of the cements consists mainly of an almost saturated solution of glacial phosphoric acid in distilled water having a specific gravity of approximately 1.650. If the acid has a high specific gravity

the cement sets slowly, and if water is added to the acid in moderate quantities the specific gravity is lowered and the cement sets quicker. Sometimes sodium phosphate may be added with advantage to the acid. The secret, then, of a good cement is to have a perfectly pure oxid of zinc and a correctly-adjusted phosphoric acid, carefully bottled in small vials so as to prevent too frequent exposure to the air, as both powder and liquid will rapidly absorb moisture and carbonic acid from it.

Glacial phosphoric acid is chemically known as meta-phosphoric acid. A solution of this acid in water changes slowly under ordinary circumstances to ortho-phosphoric acid, while the application of heat hastens the process. By heating thin ortho-phosphoric acid pyro-phosphoric acid is produced. It is claimed that the above-mentioned solution of glacial phosphoric acid gives the best results as a cement liquid; on the other hand, however, the manufacturers of the Harvard cement claim their liquid consists of pyro-phosphoric acid.

Mixing the cement in the ordinary way in the office will always be guesswork. The formation of a true phosphate of zinc is a chemical process and requires definite quantities of phosphoric acid and oxid of zinc so as to compensate molecule by molecule. Furthermore, we must take into consideration that various physical phenomena interfere frequently with the correct setting of the cement, such as humidity of the atmosphere, the temperature of the glass slab, and the metal spatula used in the mixing.

The first oxyphosphate cement was brought to the notice of the profession by the Rostaing Brothers of Dresden in 1878. It is claimed that with their death the secret of making this cement was lost. May this be as it is, the fact remains that some of the fillings made of this cement are still doing service, but they may have been accidentally better chemical combinations than the balance.

The physical and chemical nature of the oxyphosphate is so well understood at present that it is hopeless to expect improvements of such importance as to make it an ideal filling material. I believe the solution of the cement question must be looked for in a different direction, and as a suggestion I offer the possibilities of certain silicates. For instance, if silicate of soda and precipitated chalk are mixed, a substance is produced which will unite two pieces of porcelain perfectly. It takes some time, however, before

it is perfectly set. We have to look for a substance that will neither shrink nor dissolve in the fluids of the mouth.

Again I wish to emphasize the fact that it is immaterial what brand of oxyphosphate of zinc is employed as a cement, so long as the user is satisfied it is a pure oxid of zinc, free from carbonic acid and moisture, and a recently-prepared concentrated solution of glacial phosphoric acid having a specific gravity of approximately 1.650. Have a clean, cold glass slab, a horn or platinum spatula, and incorporate powder and liquid thoroughly into a perfect mix, and usually good results are obtained.

Dr. J. P. Buckley, Chicago: Like the previous speakers, I lean to the chemical side. I do not wish to detract one iota from the paper. It will serve a good purpose if it only stirs up an interest in the subject, but it will do more than this. Drs. Hinkins and Prinz are right when they refer to the effervescence that takes place in the formation of these bubbles. They are not air bubbles. The essayist called attention to the fact that bubbling took place in the small granules of the fine powder. The acid used attacks the fine granules first and dissolves them and forms a chemical union. The two gentlemen are right again when they say that we have a definite chemical compound in our very best cements.

Dr. Prinz has said many things that are correct, but when he says we should weigh the amount of acid and powder used, I know what he has in mind. To have things unite chemically they must unite in definite proportions, but he spoiled his argument on this point when he said that you must heat chemically pure zinc oxid and put it into a bottle and protect it from the air (which contains moisture and CO_2) in order to keep it from changing into a carbonate. Thus we see the powder will change if exposed to air. The fact was referred to last night that effervescence comes from the carbonate and not from the oxid. Again he told you that if the manufacturers gave us a liquid that was meta-phosphoric acid heated to a certain degree, with a definite specific gravity, we could combine them and get a definite chemical compound, but it is almost impossible to keep the meta-phosphoric acid from changing to ortho and pyro-phosphoric acid when the cork is removed from the container for using it.

Dr. Hinkins said that meta and pyro-phosphoric acid take up water and form the ortho. If my chemistry is correct we get the

meta and pyro-phosphoric acid from the ortho. You can change ordinary or ortho-phosphoric acid into either by heating. Heat it and you will drive off water—$H_3PO_4 - H_2O = HPO_3$ If you drive off only one molecule you have HPO_3, or meta-phosphoric acid, the acid we ought to have at a certain specific gravity in order to have the best liquid for cements. If we could get this liquid of the specific gravity 1.650, as stated by Dr. Prinz, and get our powder chemically pure by treating one with a certain amount of the other, we would have Dr. Hinkins' phosphate of zinc. It seems difficult to get these from the manufacturers in this manner.

Dr. Prinz: It seems that Dr. Buckley has misunderstood me. Glacial phosphoric acid should not be changed by heat to a liquid. The best results are obtained by adding water to this acid and thus obtaining a syrupy liquid of about a specific gravity of 1.650. This acid slowly changes to ortho-phosphoric acid, and when it has absorbed by exposure too much moisture from the air its good qualities as a cement liquid are materially diminished.

Dr. F. B. Noyes, Chicago: I wanted to have this subject presented from three standpoints—the microscopic, chemical and physical, but it was impossible to carry out the program except in one part. It is difficult to determine chemical reactions with the microscope, for instance, to tell what gas is forming when the cement mixes, but the chemical study of cements has never told us that *any* gas was formed, so we did discover something with the microscope that the chemists did not tell us.

Another point was brought out in the paper—that the number of bubbles formed in a given cement differs with the various colors, indicating that the substances added to cements to produce colors ruin the properties of the cement in some cases. The grey powder of one make of cement produced a large amount of gas, while the white powder of the same brand did not produce any. These facts are interesting, and I believe Dr. Prinz is right when he says that for inlay work we must look in other fields for our cement.

Dr. Poundstone (closing the discussion): The object of my paper has been accomplished—it has stirred up thought in this direction. While we cannot with the microscope determine all things connected with cements, yet it is one of the methods at our command and must not be ignored. It must be used in connection with chemistry in order to discover what we are after. You know

that the subject practically has been given up as a bad job. I have asked a great many dentists in the last few months what they knew about the cement problem, and they all answered, "Nothing." What cement do they use? A little of everything, trying various kinds with indifferent success.

We must follow this out if we expect to get anything, but I believe, as Dr. Prinz has said, that we must look for something else than the phosphate of zinc for our cement to use in inlay work, for several reasons. One of these, and by no means the least, is that it is utterly impossible to make a homogeneous mass with the cements now in use, and that result in setting inlays would be of decided advantage. Many men are advocating the making of inlays by the swaging method, that the inlay may fit the cavity absolutely, leaving no space at all. This cannot be done with the cements now in use because you cannot break up these granules. I have ground them in a mortar until my arm ached, and ground again the next day and the next, and could see little if any difference in the size of the granules. If the powder cannot be pulverized in that way it surely cannot be by spatulation in a few moments with the cement liquid, because the action of the liquid on the larger granules is very slight, in fact, none at all in some instances.

OCCLUSION AND ITS RELATIONS TO INTERMAXILLARY AND OCCIPITAL FORCES.

BY CALVIN S. CASE, M.D., D.D.S., CHICAGO. READ BEFORE THE CALIFORNIA STATE DENTAL ASSOCIATION, AT SAN FRANCISCO, MAY 16-18, 1904.

While it is probably a fact that the true anatomical relations of normal occlusion have long been well understood by dentists, and the importance of striving for its attainment in the correction of irregularities of the teeth has been dwelt upon by numberless writers and published in dental journals and text-books, it has nevertheless remained for Dr. Edward H. Angle, in his admirable work entitled "Malocclusion of the Teeth and Fractures of the Maxillæ," to present this phase of the subject in so forcible a manner that the dental profession—or at least that part of it which essays the regulation of teeth—have awakened to a fuller appre-

ciation of its importance as a guide to correction and as a means of permanency of retention.

He places the relations of the first permanent molars as the real guide-posts in diagnosis for determining or prognosticating the general relations of occlusion, which is correct: First, because the occlusal relations of these teeth are usually in distinct evidence when other teeth which might be used as guides have not erupted or are in decided malalignment. Second, the first permanent molars are the true bases of their respective dental arches, the relative antero-posterior positions of which are largely influenced by the relative mesio-distal position which these teeth assume in the jaws. Third, with a very large proportion of all human beings—and especially those in whom there have occurred no abnormal disturbances in secondary dentition—the occlusion of teeth is that or nearly that which we have learned to recognize as typically normal; while the sizes and general positions are in comparative harmony with the physiognomies in which they are placed; so that we have always before us a fairly perfect type of the mechanical and esthetic dental relations. Fourth, it being true that the relative mesio-distal positions of the buccal teeth are dependent upon those of the first permanent molars, in connection with the fact that the latter are often subjected to early influences —such as the premature loss of deciduous teeth, etc.—which cause them to shift their otherwise normal positions in the arch, we are led at once to the importance of preserving or establishing early the normality of these natural piers to the future arches, in order that normal occlusion, natural esthetic dento-facial relations, and permanency of retention be attained in the correction of irregularities.

But this by no means is the whole story of the art of regulating teeth, as one might be led to infer by much of the literature of modern orthodontists. This is but *one* of the basic principles, and it refers only to that important phase of the science which premises that the natural or inherited disto-mesial relations of the first permanent molars are or should be in harmonious relation with the surrounding physical structures, or sufficiently so that the proper attainment of a typically normal occlusion of these and other teeth will not result in the marring of facial outlines. Outside of this particular phase of the science, inharmon-

ious conditions arise that demand the consideration of other basic principles of reasoning and treatment along distinctly different lines.

It will be seen that I do not go so far as Dr. Angle and others and say that when the teeth are in normal occlusion they are in correct positions with relation to the normal and therefore regular, or not in malposition; nor that when the physiognomy is perfect in esthetic outlines it is a sure indication that the teeth are in typically normal occlusion—not malposed or irregular. Nor again, that when we find the first permanent molars of youth in mal-mesiodistal occlusion in correcting the occlusion by a reciprocal movement of both the upper and lower teeth, with the inter-maxillary elastic force or otherwise, we can be assured that the other teeth will take—or can be made to take upon this basis—the positions that are most desirable as regulated teeth.

There are many reasons why these propositions should be negatived, but I will give a single simple one which everyone can see. In a case that otherwise would be perfect the premature loss of deciduous teeth may be the cause of both the upper and lower first molars drifting forward fully half the width of a bicuspid and possibly more, and in that position assuming perfectly normal occlusion or typical disto-mesial relations to each other. Now these teeth being the bases which have determined or are determining the antero-posterior position of the other teeth in relation to the normal—or if taken as bases or guides because of their apparent correctness in position due to their perfect occlusion and the other teeth in front forced to alignment without extraction—can the result be otherwise than an abnormal protrusion of both the upper and lower teeth in relation to the physiognomy? Therefore, though we have a typically normal occlusion it may be accompanied with one of the most marked dento-facial deformities, as is frequently seen in inherited full protrusions.

These conditions in varying degrees, together with full retrusions of the upper and lower with the same perfect disto-mesial relation and occlusion of the teeth, we have about us everywhere. Many of these are inherited conditions or types and come from no local cause whatever, and frequently are quite as susceptible of correction by orthopedic means as protrusions or retrusions of the upper or lower alone.

To go further, in those cases where the upper or lower buccal teeth occlude mesially to normal in relation to opposing teeth, the occlusal relation does not indicate in itself either the character of the irregularity or the movement demanded for its correction, for it may be a protrusion or retrusion of the teeth of one jaw alone, and with these relations this is far more frequent than a malposition of both. Therefore it should be well understood that a reciprocal movement of the upper and lower teeth with the intermaxillary or other forces for the purpose of producing a normal occlusion of the molars, which has been so loudly voiced of late as one of the great discoveries of modern orthodontia, and believed by many as universally applicable for nearly if not all cases, is in reality only indicated in one single character of irregularity, i. e., that of a protrusion of the teeth of one jaw and a retrusion of the teeth of the other, a condition that can be determined only, like all other irregularities of the teeth which affect the esthetic harmony of facial outlines, by a careful study and comparison of the relations of the teeth to the physiognomy.

In cases where retrusion or protrusion of the teeth of one jaw alone is indicated, as for instance in that very common decided protrusion of the upper teeth—the lower teeth and jaw being in normal esthetic pose—the occlusion of the bucco-distal cusp of the upper molar fairly between the buccal cusps of the lower, and the upper second bicuspid upon the first and second lower bicuspids, or fully the width of a bicuspid in front of a normal occlusion—if these cases are recognized and operated upon early or late with the unrestricted action of the intermaxillary force widely known as the "Baker Anchorage," resulting in a reciprocal movement of the upper and lower teeth with the final attainment of normal general occlusion, it must inevitably result in an abnormal protrusion of lower teeth that were already in perfect esthetic relations to the physiognomy and with only a partial correcting of an upper protrusion. In other words, with the final result of a composite abnormality, which if correctly defined must be a partial protrusion of the teeth of both jaws. Therefore in this connection, as elsewhere expressed, "I wish to protest against the above practice and misuse of the intermaxillary force, and notwithstanding the teaching which has recently come from eminent quarters, to advise the extraction of the first or second bicuspids from an overcrowded

arch in all cases of inherited excessive protrusions, and especially in protrusions of the upper where the lower teeth and jaws are in harmonious relations."

Again, if it is maintained—as it certainly is—that all corrections of irregularities should be accomplished without extraction, this would mean that the *real* correction in the above case should be accomplished without disturbing the position of the lower and with the distal movement of all the upper buccal teeth fully the width of a bicuspid. If such an extensive distal movement of the crowns of buccal teeth were possible, and I am free to admit that it is if taken early and with a proper combination and application of intermaxillary and occipital forces, though not without the probability of a decided distal inclination of masticating teeth—even admitting this to be possible, I should still doubt the advisability of such an attempt, especially after the eruption of the second molars. "Moreover, I cannot see the advantage (as I have said elsewhere) in a considerable and very questionable distal movement of molar teeth that are in *natural* positions in the jaw, or in other words, that have not moved forward to unnatural and abnormal positions through the influence of dental or artificial forces, unless the operation contemplates the ultimate extraction of the third molars, which are often quite as important in the dental economy, especially when uncrowned in development, as the first or second bicuspids, particularly when the loss of the latter teeth in appearance and effect is hardly discernible."

This would mean also that one would need to keep in touch with these cases—which is usually impossible—and be ready to extract the third molars at the very beginning of their eruption—else you may be sure that the influence of these teeth upon a crowded dental arch that is artificially posed and therefore predisposed to a protruding movement, and with its bases encroaching upon the room which the third molars require for eruption, will destroy all your efforts of correction, even though opposed by the retaining forces of a typically normal occlusion.

For fear that someone may imagine I do not value the general importance of perfect occlusion and non-extraction of teeth, I will repeat that which I have been expressing for years, and recently at the last meeting of the Institute of Dental Pedagogics as follows: "In the correcting of all irregularities of the teeth with

the view to their permanent retention, occlusion is one of the most important factors for consideration in diagnosis and prognosis.

"In every case where the masticating teeth have established a fixed occluding position with cusps that interlock or interdigitate, whether it be typically normal in its relations or not, any change of that position necessary for the accomplishment of correction should place them in a new occlusal position of self-fixation; else nature either in her forceful efforts to perfect the function of mastication, or in response to the law of inheritance, will mar or wholly destroy the perfect results of treatment, even though they be artificially retained for years.

"In cases where one or more teeth of either jaw are crowded out of arch alignment or are malturned and overlapping, if held in that position by the fixed occlusion of other teeth, any movement to accommodate them that is destined to affect the relative positions of the bicuspids or molars will usually require a concomitant movement of the occluding teeth of the opposite jaw.

"In a large proportion of cases, and especially those which appear in the simple and complex groups, the position of the teeth and the relative size and general relation of the jaw bones indicate perfect harmony with the stage of their development or sufficiently so to make the rule imperative, that we strive to produce a typically normal occlusion—an attainment that is impossible where teeth are extracted merely to simplify the operation or under a mistaken impression that regulation cannot otherwise be accomplished.

"This does not mean that the principal and only object in practice is to attain to the production of a typically normal occlusion at the expense of producing or retaining a facial deformity, and especially when by the extraction of the first or second bicuspids we can place the operation within sure and easy possibilities of correcting the facial deformity and leave the patient with a good masticating occlusion—often so perfect that only an expert is able to discover that teeth are missing.

"In the contemplation of obtaining room for the correction of malposed teeth or for the freer eruption of the permanent teeth of youths, by the expansion of immature arches or by the extraction of temporary or permanent teeth, the harmonizing influences of growth with the natural enlargement of the alveolar

arches should never be lost to sight. If dentists would give more thought to this subject and to the possibilities of judiciously enlarging the arches in keeping with the present and future development of other parts, there would not be that ruthless and uncalled-for interference and that wholesale malpractice of extraction that now disgraces the science of orthopedic dentistry.

"With modern methods and principles of applying force to the teeth, the dental arches can always be sufficiently and harmoniously enlarged—at both the occlusal and apical zones if required—to place all the teeth in the arch, however extensively malposed, in perfect alignment. Therefore *that* phase of the question should never arise as an obstruction to correction without extraction. But the principal question which should be considered under these circumstances is: Does the present condition or will the future development of facial contours demand or permit such an expansion with a concomitant movement of opposing teeth if necessary to perfect the final occlusion.

"In the old methods of enlarging the dental arch with plates, etc., and even with some modern appliances, the arches were always expanded laterally, with little or no thought to the possibilities of the far more important distal movement of the bicuspids and molars, which is frequently demanded to restore them to the positions from which they have drifted and which Nature intended they should occupy, to prevent the front teeth from being proportionately protruded.

"It, however, is not advisable after the erupting of the second molars to attempt an *extensive* distal movement of back teeth that have not been moved forward by natural or artificial forces. Nor is it advisable to laterally expand arches to a width that is more than relatively normal, with the frequent production of an unnatural exposure of back teeth at every movement of the risorius muscles, that were more often seen during the expanding-plate period from the hands of dentists who believed that extraction is never demanded nor required. To assert this is to deny the influence of admixture of the types of different nations and races, which through the laws of inheritance and variation have produced the great variety of physical forms that are found especially in America, where these causes have had full sway."

I am led to infer that you wish to learn all you can of the "Baker

Anchorage," or that principle of motive power for the regulation of teeth which I call the "Buccal Intermaxillary Force." Among a number of reasons why I prefer the latter title may be mentioned the fact that it is in no sense an anchorage any more than a traction bar or any other motive principle is an anchorage. As for the other reasons, I question the right of any man to tack a questionable name and patented claim upon an invention seven or eight years after it has been extensively published by another person.

In regard to its real value as a principle of applying force for the regulation of teeth, like many other principles in orthodontia its value cannot well be overestimated if properly applied in those cases where it is applicable and where the particular movement it will effect is demanded. But I wish also to assert the opinion, based upon an experience of over ten years in the constant employment of this principle in every possible way and for hundreds of cases, that the extensiveness of its applicability has of late years been greatly overestimated; and, as I have elsewhere said, "if these enthusiasts continue to attach intermaxillary rubber bands of the heft recommended to single molar anchorages, and especially to the first molars of youths, it will not be long before they equally underrate the true value of this principle of applying force."

My reason for this statement is based upon the great extruding tendency of this force every time the jaws are opened. Even with stationary anchorages attached to two and three teeth, and with the intermaxillary hooks attached to the most distal extremities in order to keep the rubber ligatures as much as possible in a horizontal position, where much force is used watchful care should always be exercised to prevent the molars from being lifted more or less from their sockets. This extruding tendency of the intermaxillary force will obtain especially with mouth-breathers, who form so large a class of our patients in this department, and because of this tendency alone its applicability will be frequently limited even in those cases where it is most demanded. In all close-bite occlusions, however, it is of the greatest advantage, especially in those cases of protruding uppers where the lower incisors bite into the gum back of the upper incisors.

When it is remembered, as before stated, that in nearly all simple and complex irregularities which form a very large proportion of all our patients in orthodontia, the mesio-distal relation of buccal

teeth is so nearly normal or so posed as to make no demand whatever for the intermaxillary force, we at once become aware of the fact that it is far from universally applicable. In all cases (except in open-bite occlusions) where a reciprocating protruding and retruding movement of the teeth of both jaws respectively is demanded, and as an auxiliary force in a properly constructed apparatus for retruding or protruding the teeth of one jaw alone, and as an aid to the occipital and other anchorage forces, it certainly is invaluable.

NEURASTHENIC PATIENTS—WHAT SHALL WE DO WITH THEM?

BY C. C. MOTTINGER, D.D.S., AKRON, O. READ BEFORE THE NORTHERN OHIO DENTAL ASSOCIATION, AT CLEVELAND, JUNE 7-9, 1904.

One of the great questions confronting the dental profession to-day as never before, when science on every hand is making such great progress, is how to make dental operations of all kinds entirely painless and yet whenever possible to have the patient absolutely conscious. When Dr. Horace Wells in 1844 discovered nitrous oxid gas, and demonstrated its use in all minor surgical operations, he conferred upon the dental profession one of the most lasting blessings man could bestow upon future posterity. The profession was at first slow to adopt this new anesthetic and make use of it in daily practice, but after becoming better acquainted with its properties and effects they gradually introduced it in their operations, until to-day it is freely used in most dental offices.

Nitrous oxid, nitrous oxid and pure oxygen, ethel bromid, and some of the other newer anesthetics, such as narcotile and somnoform, have answered their purpose very satisfactorily, and to-day the dentist can assure his patients that in nearly all minor surgical operations which he is called upon to perform in the buccal cavity there will be absolutely no pain. With this positive assurance he finds little difficulty in inducing even his most nervous patients to have offending roots extracted, the antrum of Highmore opened into, the drill passed through the outer alveolar plate to open a stubborn blind abscess, or a semi-putrescent pulp removed. From their own experience, or that of their intimate friends, they are convinced that there will be no pain.

For those patients who do not want to be unconscious when a minor surgical operation is being performed we call to our aid cocain, nirvanin, eucain, adrenalin and other drugs of that class, and in most cases they prove to be very valuable allies. So you see along the surgical line the dental profession has about accomplished the elimination of pain; that from which the healthy as well as the delicate, the strong and the robust as well as the most nervous, all shrink with dread. But how about operative dentistry? To have the drill run into that sensitive cavity! Now we have the serious question that confronts the profession everywhere. Sarah Van Buskirk has written a parody upon the lines of Edgar Allen Poe, which describes the feelings of the patient as he faces that terrible moment (DENTAL DIGEST, Nov., 1903, p. 1430).

The manner of handling nervous patients while in the chair will in most cases have a decided effect upon them. The operator, seeing that he has such a patient before him, should not become nervous or excited, and the patient's attention should be diverted from the dread of the operation. This can sometimes be accomplished by engaging in pleasant conversation for a few minutes on some topic that will be of interest to the patient and by maintaining an easy and dignified self-possession. Most of the profession understand this method when operating upon a child but fail to apply equally strategic methods when dealing with an adult. With nervous patients the dread of the drill is often more wearing than the drill itself. The thought of undergoing an operation produces much the same psychic effect upon the mind of the adult as upon the mind of the child, for in the dental chair we are all children—some a little older grown.

In performing an operation nothing but the sharpest instruments should be used, and the cavity should be kept perfectly dry whenever it is possible to do so. Various medicaments may be applied in the cavity to relieve sensitiveness. Among these may be mentioned a solution of menthol, cocain and carbolic acid, zinc chlorid in an alcohol and chloroform solution, vapocain, hemicranin, and many others.

Many times we are confronted by patients who say they are extremely nervous and their teeth exceedingly sensitive, but upon examination it is found to be untrue. Such patients may be said to be suffering from a mental pain or a fear in the pain-center of

the brain. As a general rule the application of medicaments of some kind above referred to is effective with this class.

There remains another class of nervous patients that are not so easily treated, for in addition to suffering great mental pain and nervous excitement they undergo extreme physical pain. In such cases the nerve fibrils in the dentin are very sensitive and are easily irritated by the action of the drill. The rest of the nervous system out of sympathy responds to the action of these minute fibrils and the patient is thrown into a state of uncontrollable nervous excitement. Cataphoresis is especially applicable in the treatment of such individuals. By this method certain fluids, together with the substances they hold in solution, can be conveyed from the positive pole into the nerve fibrils and tissues of the pulp of the tooth toward the negative pole. Cocain seems to be the best anesthetic thus far discovered that will break up into proper soluble form to be carried into the tissues of a tooth by means of a continuous current.

One of the strongest arguments for this method of treatment is that the anesthetic can, by the proper application of the current, be carried into the tissues of the tooth to the desired parts without any previous excavation. Great care should, however, be exercised in the use of electricity, for the immediate application of too strong a current will produce pain, and if the current be allowed to run into the cavity for too long a time or at too high a voltage the life of the pulp will be endangered. These dangers can all be avoided by the use of only the most accurately constructed instruments and a careful handling of the same.

Much more might be said in a paper of this character concerning the treatment of the neurasthenic patient, but in conclusion let conservatism in the use of any new or untried drug or treatment, whereby permanent injury might result, be the watchword.

Discussion. *Dr. W. H. Whitslar,* Cleveland: Three years ago I read a paper on "Neurasthenia" and I should simply like to read what I stated at that time. A succinct definition is given by Prof. F. X. Dercum who says, "Neurasthenia is a persistent diminution of nervous energy, together with an increased reaction, mental and physical, to external impressions." Dana, an eminent authority, says, "Neurasthenia is a chronic functional nervous disorder which is characterized by an excessive nervous weakness and irritability, so that the patient is exhausted by slight causes and reacts morbidly

to slight irritations." In Ranney's "Lectures on Nervous Diseases" we find, "Neurasthenia is said to include all manifestations of the condition known as nervous exhaustion."

I therefore assume that it is not exactly a disease in itself, but an incoordinate action of neurility, whereby it may be made the basis of many functional diseases. These definitions also indicate that two forces are concerned in neurasthenia—namely, neurism and psychism. As the mental processes are highly predominant in the affection, we are reminded of the remarks of Huxley, who said, "In all intellectual operations we have to distinguish two sets of successive changes—one in the physical basis of consciousness and the other in consciousness itself; one set which may and doubtless will in course of time be followed through all its complexities by the anatomist and physicist, and one of which only man can have immediate knowledge. As it is very necessary to keep up a clear distinction between these two processes, let the one be called neurosis and the other psychosis."

Neurasthenia affects the whole system. Evidences of a neuropathic constitution lead one to suspect nervous stigmata, and irregularities of mind and muscle become apparent. To be specific, two principal symptoms of neurasthenia are nerve weakness and nerve irritability. Clinically, there are two types of affections—namely, the cerebral and spinal stigmata. A further analysis of neurasthenia pronounces it both as simple and that which is associated with other diseases. Disassociation of these forms is difficult, for often diseases of the liver, stomach, uterus, etc., are really dependent upon a morbid weakness of the nerves. In the simple forms of neurasthenia the symptoms are not perceptible, but are subjective. In combination with hysteria, epilepsy, etc., the objective signs are recognized. In neurasthenia the special senses are not always affected, but may become exciting causes of the disorder. For instance, we perceive congenital defects of vision which later cause change of habits and of the work of children. Neurasthenia in children is often ascribed to "overwork" when it finds its etiology in astigmatism, muscular insufficiency, myopia, or hypermetropia. The far-sighted (hypermetropic) child neglects books and cares for out-of-doors sport; the near-sighted (myopic) child does not care to play out-of-doors, and reads more than is usual or best for him, hence we notice children of the latter class acquiring sedentary

habits and becoming nervous and irritable. They lose their power of coordination, and neurasthenia is produced long before the cause is recognized. In this class of dental patients we find aggravated conditions which interfere with the proper care of the teeth. The same results may be said of those affected with muscular insufficiency and hypermetropia. An eminent oculist informed me that he observed more affected with neurasthenia of the above classes than those afflicted with myopia, because the latter class give up to their conditions more readily.

A large proportion of people use their brains in the struggle for existence. It is remarkable to what extent brain matter may be used before the cells composing it are exhausted; they do become exhausted, however, from overaction. Brain cells are much like muscle—if overworked exhaustion is produced. "Musso, on observing that soldiers presented in the evening, after a day's march, fatigue in the arm and leg muscles, conceived the idea that fatigue altered the composition of the blood, and he afterward discovered that the blood of the fatigued animal when injected into an animal at rest produced in the latter the characteristic symptoms of fatigue." It should be remarked here that neurasthenia does not stand in relation to the blood as does anemia, chlorosis, etc. It affects the nervous system directly.

C. F. Hodge, in the *Journal of Morphology*, 1892, gives some remarkable experiments which were made upon animals before and after fatigue. As an illustration, the nerve cells of bees that had worked all day were compared with those of the same hive that had been resting during the same period. In all instances, and in other animals upon which the same experiments were performed, changes were discovered in the nerve cells, and the changes were always the same. It was found that the nucleus of the cell decreases in size and becomes irregular in outline. The protoplasm of the cell shrinks and spinal ganglia are vacuolated. The cell-capsule, when present, has a decrease in the size of its nuclei. Lastly, nerve cells recover if allowed to rest for a sufficient time, the recovery being slow.

From these conclusions we infer that from the loss of cell substance there must be much waste product circulating in the blood, and, as related in the experiments of Musso above quoted, the excessive material has a toxic action and thus paralyzes the system.

In other words, there is an autointoxication of the tissues from simple fatigue. There is in this a suggestion of the similarity to autointoxication due to indigestion, as related by Dr. Talbot, who states that autointoxication from indigestion involves the whole mucous membrane of the alimentary canal and especially the mouth, in which there is a change of the secretions and thickening of the mucous membrane. It is stated by Professor Dercum that there is a relation between gout and neurasthenia, with the fact that "neurasthenics very often contain uric acid in great excess. Uric acid is not, as has long been taught, a substance standing in complementary relation to urea. We have reason to believe from the researches of Horbaczewsky that it represents the chemical disintegration of the nuclein constituent of cells, and if this be true its presence in excess in neurasthenia and the relation of gout to neurasthenia acquire a new significance."

It is often reasonable to claim that the much-discussed disease familiarly known as pyorrhea alveolaris is without question an example of an overworked, exhausted, peridental membrane whose tissues are intoxicated with the excessive material in the blood currents and intercellular tissue. It is a neuratrophia or impairment of the nutrition of the nerves. Exhaustion of the peridental membrane when it occurs is often confined to one or more teeth, and is the result, first, of some irritation, and second, an attempt to relieve the uneasiness produced by the irritation with the pressure against the occluding teeth. With pressure comes exhaustion, "neurasthenia localis," which eventually terminates in the graver tissue destruction. From the presence in the blood of toxic substances as an outcome of profound neurasthenia, from whatever cause primarily, it is just to argue that all tissues of the mouth which are subject to blood currents may suffer from toxic condition. The cacochymic state undoubtedly produces neurasthenic conditions surrounding the teeth, as well as of the recrementitious fluids of the mouth. Further, it is my thought that stigmata of the enamel, as shown by the so-called atrophied spots and pits, are the relics of trophoneurosis—an impairment of nutrition which may be due to exhaustion. This condition is mainly found in third molars.

In the treatment of neurasthenia there are two elements to consider—the patient and the dentist himself. In both we sometimes find the same conditions, that is, worry, fear, exhaustion from tem-

perature, deficient respiration and psychic disturbances. The dentist is exhausted by continued physical labor and anxiety for the care of those whose nervous systems are exalted and intractable to common measures. He is compelled to reduce psychic disturbances by putting himself *en rapport* with the patient. This signifies a depletion of his own neurodynamia or nervous force. The first principle of this treatment is to secure passivity of the patient. Rest is the *sine qua non* treatment for neurasthenia. Upon this fact Dr. Weir Mitchell based his famous treatment of neurasthenia, known as the "rest cure." In the performance of dental operations there is no opportunity to follow in detail the rest cure for lack of time. We produce, first, as above stated, passivity, then comes faith. With a basis of passive or restful thoughts and the concurrence of faith or confidence in the dentist, he (the dentist) now is able to suggest orally, or through the subjective mind, his control of the sensation of the body. This proposition is based upon the hypothesis that man has two minds, that is, one the objective mind and the other the subjective mind, and also upon a subsidiary proposition which relates to the subject of psycho-therapeutics—namely, "the subjective mind has absolute control of the functions, conditions and sensations of the body." It is believed that the above propositions are the fundamental elements of the whole domain of psycho-therapeutics. Where is there a dentist who has not felt the need of this power and who does not indeed use it, unconsciously or otherwise?

When neurasthenia is recognized in a patient who applies for services, prudential measures for the care of the teeth are necessary. If there is any condition that requires care it is at this period, for many cases of neurasthenia drag out for years, and the patient eventually dies of some intercurrent disease. As shock is often one of the causes of this disorder, all subsequent operations are under restraint, and should be in many cases only temporizing. It is advisable to prepare the patient for the operation by suggesting a period of rest previous to the visit, a good night's rest, or the use of medicaments, as a sedative or stimulant, as the case requires, is frequently desirable. Strychnia, potassium bromid, antipyrin, morphin (used rarely), are some of the most reliable remedies. Hot water as a drink before and after operations is one of the most valuable remedies, and its value may be enhanced by the use of

some of the milk foods of which we have familiar knowledge. Good food is at all times essential to the well-being of any individual, and it has double value in neurasthenia. Good sleep, good food, are health-restorers. In local neurasthenia of parts of the body, for such may occur, we believe the conditions of the part suggest the treatment. It must be remembered that there are different phases of neurasthenia and a specific treatment is not known.

Now in regard to the production of passivity, I remember at a meeting years ago, when we met that great man, now dead, Doctor Baldwin, he said he got right at the heart of the patient the moment he came into the room. The paternal feeling he exhibited to that patient did draw to him the faith he could have in him, not only by words, but by contact. The warm nature has a great influence upon the mind of the patient in the mere contact. You go to the patient with your hands cold and there is a repelling feeling exhibited at once. Therefore wash your hands in hot water rather than cold water before going to a patient. Have the blood in your hands, not in your feet. There is a reason for that, and Mr. Hudson draws this conclusion. When we place our hands together we place the terminal ends of the nerves together; the nerves are the elements which convey the impulses to the brain. Therefore, in the contact between the patient and the dentist there is the possibility, and yes, the liability that we can convey to the mind of the patient the subjective thought that we are trying to impress upon him that it will not hurt. So that we suggest to the patient the possibility that he may be at ease, and it is received and therefore puts him into the condition of relaxation.

Dr. Pettibone: Along this line I notice you recognize the bromids and strychnin. I have seen other things used that I know give more benefit. In this way you get a complete relaxation for some time, which will produce a paralysis without losing the power of their muscles. Some object to them for fear they will become habitual. I would like to have the profession try it. It came to me from a man who had done a great deal of experimenting along this line, sometimes he found cases so thorough as to put them in complete relaxation.

Dr. G. S. Junkerman, Cincinnati: The question of psychic phenomena is interesting to me, and I think that dentists should learn as much as possible about it. Speaking of dividing the mind into

two features, the objective and the subjective, let us call it conscious and subconscious which refers to the same division. There are good reasons why the mind should be thus divided. The conscious mind is supposed to have its lodgment in the cerebrum of the brain, the subconscious in the cerebellum. Impressions have been issued in the upper part of the head, and while the person is still unconscious he is able to move the muscles of the body; and again they have been issued from the base of the brain, and while the person remained conscious, was paralyzed. Now, then, from a medical standpoint. A physician gives his bread-pill when he has nothing else except his patient's confidence, and the patient gets relief because of the faith he has that the physician can cure him, and it has the desired effect, because the conscious mind is acting through the subconscious and the subconscious controls the functions of the body. If you will keep this in mind you will see how it can do an immense amount of good. The physician tells you you must think you are going to get better. That is three-fourths the fight. The conscious mind begins by doing a certain thing and the subconscious takes it up. The subconscious acts automatically and the conscious controls the body through the subconscious mind. Now we form a habit. Habit is simply a thing repeated and becomes a part of our nature, hence the subjective mind has been acted upon so often that it will go that way even when we want to go the other way, and we have a hard fight in order to stop. So you see how we can act upon our patients in this way, suggesting to the subconscious mind by the objective mind. We thus assist nature to bring about restoration. It is worth thinking about.

GOLD FILLINGS.

BY EDMUND NOYES, D.D.S., CHICAGO. READ BEFORE THE ILLINOIS STATE DENTAL SOCIETY, AT PEORIA, MAY 10-12, 1904.

Is there any prospect that the filling of teeth with gold will become a lost art or an obsolete operation in dental practice? Perhaps not while such good men teach it in some of our schools, but I am convinced that this class of operations has too many enemies and is in need of the active support and defense of its friends. For many years gold fillings have been subjected to far more suspicion, discredit, and restriction in the scope of their application than they

should have been, and their enemies have been numerous and aggressive. First came the "New Departure" people with the dictum "In proportion as teeth need saving gold is the worst material to use," and they proceeded to substitute for it gutta-percha, which usually leaks and is the nearest impossible to keep clean of any material we use, or cement, which is always a temporary filling, will never stand for an occluso-proximal corner, and in every case where any contour is required soon dissolves away enough to allow the closing together of the necks of the teeth, eliminating the interproximal gum space, or else, and oftenest in all teeth back of the cuspids, they used amalgam, which in those days always leaked, and in the cases specified, in which susceptibility to decay was great, was almost invariably very short-lived, much shorter than *properly* made gold fillings in similar places.

I will not discuss or pass judgment here upon the question of "compatibility of filling material with tooth substance," or the greater susceptibility of electro-positive or electro-negative to the action of the ferment acids formed at margins of fillings not often enough cleaned. It is certain that the leakage, the want of edge strength, and the frequent lack of proper finishing, far outweighed any advantage from greater "compatibility." My observation seems to justify a belief that "compatibility" consists chiefly in a tight enough joint and a smooth enough finish to prevent the intrusion of injurious outsiders between the filling and the adjacent walls or margins. It is my opinion that the encouragement the "New Departure" gave to the use of amalgam has been of vast injury to the profession and the people whom we serve. Amalgams are better now than formerly, and if properly used in the right places will do very good service.

Another enemy of gold fillings is the man who says, "These teeth are too soft to be filled with gold," and proceeds to fill them, if anterior teeth, with cement a few times and then crown them. Lately the porcelain inlay has come to the rescue of these men, and it is a no less important addition to the resources of those who have heretofore successfully filled front teeth with gold. Porcelain will prove a worthy and successful rival of gold for a large proportion of the operations in the front teeth. In bicuspids and molars the man who thinks them "too soft" to fill with gold uses amalgam, and if he be a careful operator he does so with very fair success,

but with not so good results in many of the cases as if they were well done with gold.

By far the worst of all the enemies of gold fillings are the horde of operators who either cannot or will not make them properly. If a man finds by experience that everything else he puts into tooth cavities preserves them longer than the gold he puts into them, of course he comes to the conclusion that gold is a poor filling material, and of course he cannot be expected to believe that it is the operator who is unfit instead of the gold. This is not a pleasant aspect of the case to discuss, and we never, if we can possibly avoid it, say that any one particular operator does not make good gold fillings, but ask any really good operator what proportion of the gold fillings he sees, made by others besides himself, can fairly be called *good,* having sufficient solidity, good adaptation enough not to leak, well-finished margins, good contour, and the borders laid along lines of comparative immunity, and if he answers candidly he will be obliged to say that the proportion is lamentably small. It is my opinion that the enormous number of improperly made gold fillings seen throughout the length and breadth of the United States has done more than all other influences combined to put discredit upon gold as a filling material, and to restrict or prevent its use in many cases where it might be so employed as to perform the best service attainable with anything.

What are the reasons that so many gold fillings are badly done? I can name only a few. First, the want of proper instruction. In a few schools the students are really *taught* in technic laboratories and the clinic rooms, and become at least fairly good operators if they have the inherent capacity and desire to become so, but it is to be feared that in many schools of dentistry it is still true, as it once was of most of them, that the students are instructed from the lecture platform and are allowed to *practice* in the infirmary, working out their own salvation by their own experience and by correcting their own mistakes whenever they happen to be bright enough to realize that they have made any. A few of the men from such schools become good operators, but a larger number are making the sort of gold fillings I have been lamenting, or are using amalgams, cements, crowns, etc., where they ought to be using gold.

Another important reason for these bad fillings is the use of too

large plugger points with too little mallet force. I sometimes see men in clinics using points with from two to four times the packing surface of the ones I find it necessary to employ, and apparently using much less mallet force upon them than I find to be required upon the smaller points. It is impossible not to infer that the gold they are packing lacks the necessary solidity. The angle of direction in which gold is forced against walls and margins is also important. The angle between the plugger point and the wall against which gold is being packed should be less than a right angle if possible, and usually the building should be so done that the portions next the wall can be *wedged* between the wall and the portions of gold already condensed. The use of some non-cohesive gold next to walls and margins makes perfect adaptation easier, but it is by no means indispensable. There are a few situations, however, in which perfect adaptation is impossible without some hand work or the use of back-action pluggers. The packing of gold into a tooth cavity is a very definite and certain process, but it is governed by inexorable physical laws which cannot be transgressed without imperfection in the result. One of these laws relates to the size of the plugger points, the number of thicknesses of gold used, and the force of the mallet blows that fall upon the plugger. If the points are as small and the layers of gold as few as they should be, the packing of gold takes considerable time, even with the most rapid blows that an assistant can be taught to deliver and the least possible loss of time in carrying gold from the annealer to the tooth. If the fillings are very large it takes a great deal of time, enough to prove a severe test of endurance for both patient and operator. It is for these that gold inlays will prove a very important addition to our resources. *The durability of very many fillings that might have been excellent is diminished by improper finishing. It requires the closest observation, the greatest care, and often much time to trim a gold filling accurately to the margins and to shape it to just the right contour.* Well-condensed gold will cut down so smoothly under discs or tape and show so regular and thin a margin that a careless eye may think it is trimmed when it is still overlapping the borders of the cavity considerably. The sharp trimming knives are a great help in finding the exact margins of the cavity, but they need to be very sharp and to be used very carefully. I cannot attempt to describe

fully the technique of gold fillings, but have indicated a few, perhaps the most frequent, particulars in which they are often imperfect.

Porcelain inlays and gold inlays in the practice of some operators are now displacing gold fillings to such an extent as to suggest the question at the beginning of this paper, and make it seem plausible that we may soon have a class of men who use porcelain inlays in the front of the mouth, and gold inlays and amalgam fillings in bicuspids and molars, and cut off and crown the teeth which they cannot manage in either of those three ways. Individually and collectively men are prone to run into excesses and to carry hobbies and habits to extremes of application. In the old days we had one set of men saying, "A tooth that is worth filling at all is worth filling with gold," and at the other extreme the "New departure" men announcing the dictum already quoted, "In proportion as teeth need saving gold is the worst material to use." Later and not so very long ago we saw crowns on hundreds of teeth that might have lasted much longer if they had been well filled. Now a few men appear to be putting in porcelain inlays almost to the exclusion of all other fillings, and this may be justifiable for them if they have narrowed their range of skill and their habits of practice and have attained great perfection in their specialty.

It is desirable for average men who are fairly skillful in all the ordinary operations of dentistry to have some rather definite guiding principles and ideas whereby to determine which of the many possible operations it is best to make in each of the cases that present day by day in endless variety. For the filling of molars and bicuspids we have gold fillings, gold or porcelain inlays, and amalgam fillings. The use of amalgam heretofore (by those who can make *good* gold fillings) has been determined by the poverty of patients or their want of physical strength or health safely to endure gold operations, or by their unwillingness to do so. These latter objections seem to be largely overcome by the use of inlays, and in the future amalgam may perhaps become the poor man's filling more distinctively and exclusively than ever before.

When the choice is narrowed to a gold filling or a gold inlay, what considerations shall determine it? Most certainly the proper places for gold inlays are very large cavities, especially in pulpless

teeth, and very deep ones in live teeth. I do not know if the experience of others is like my own, or whether my lack of success may not sometimes have been caused by failing to cut down occlusal enamel and build gold over it, but at any rate I have often been disappointed by the breaking off of a corner or side of a tooth from a very large filling, and in many of the cases it seemed as if the bite could hardly be responsible for it. These breaks have not usually happened immediately, but after a few months or years. It has seemed to me probable that the insertion of the filling put sufficient strain upon the side walls of the tooth to cause them to snap, after enduring the strain for a longer or shorter time, and yet if the gold is condensed less solidly, with a view to diminishing such strain, it will either fail of perfect adaptation at some point or will not withstand the force of hard biting upon it. Teeth filled with amalgam sometimes break in a similar way, though less often than those filled with gold. All occlusal cavities, unless very large, I believe should have fillings rather than inlays. The time required to make them is less and the chances of perfection and durability are greater. This applies especially to the large number of occlusal pit fillings required for patients from seven to twenty years old. I believe also that shallow cavities which penetrate the dentin but little if any more than is required for anchorage should usually be filled, however great may be the extension for prevention required. Proximo-occlusal operations of this sort are often rather large and require a great deal of time, but whether fillings or inlays they must have occlusal anchorage. They must usually be extended so widely at the gingival border as to require cutting the width of the occlusal step nearly to the points of the cusps in order to draw an impression or inlay occlusally, and it must be drawn occlusally in order to seat the inlay securely. Such wide cutting of the step weakens the cusps more than would be necessary for the secure anchorage of the filling. It may perhaps be said that such wide step cutting may be avoided by drawing the impression and inserting the inlay proximally instead of occlusally. I will not say this may not succeed in some instances, but it implies a "cement anchorage" in the strict sense of the term, the strength and adhesiveness of the cement being the only support of the inlay against the force of the bite that tends to push it out toward the proximating tooth. We all know that a

proximo-occlusal corner of cement will break off very quickly if subjected to any hard biting, and it is hard to see why a joint of cement can hold an inlay much more strongly by its adhesion, though doubtless it will resist a somewhat greater strain, for we observe that the cement fillings above referred to always break, instead of being pushed bodily away from their seats. Again, I have seen too many gold fillings which depended for their retention upon a cement anchorage and were forced out by the stress of mastication, to have entire faith in the retention of inlays by the same means.

Are gold fillings in the six anterior teeth destined to be entirely displaced by porcelain inlays? Doubtless to a great extent, but I think not wholly. For lingual pits, for distal cavities in cuspids and some lateral incisors, and for a good many small proximal fillings that do not reach the labial angle, gold is not unsightly and will prove at least as trustworthy as porcelain. There are a few persons with upper lips so long and so habitually covering that part of the teeth as to admit of gold or gold and platinum fillings in gingival cavities without having them ever exposed to view.

The cases in which gold fillings in front teeth will longest and most persistently maintain their supremacy are in the mouths of hard biters, mostly men, who wear off their teeth by an end-to-end occlusion or by hard use, owing to the loss of molars, and for whom nothing but platinized gold will withstand the force to which they are subjected. A few such persons will have to endure the unsightliness of gold-tipped teeth for the sake of the service they will render.

I believe a few of the older and more conservative men regard the question as still an open one, whether in the end it may not have to be conceded that until we have a better cement the use of inlays should for the most part be restricted to mouths comparatively immune, or to cases in front teeth where the inconspicuousness of porcelain inlays is of more importance than the greatest attainable durability, and in cases in molars and bicuspids where gold inlays can be put in pulpless teeth or deep cavities or come into competition with amalgam fillings as the alternative. A few of the most skillful and experienced users of inlays claim that they have *never* seen any decay adjacent to or underneath an inlay, but such a claim seems extravagant and so contrary to experience and

observation of all other fillings, including cement, that it seems right to require the test of long time and very extensive and conclusive observations before accepting fully such a statement.

If the guiding principles I have laid down are fairly correct there will still remain a very important place to be occupied by gold fillings, notwithstanding the encroachments of porcelain inlays for front teeth and gold inlays for back teeth, and the far too large place that amalgam will continue to usurp.

Discussion. *Dr. J. N. Crouse,* Chicago: The first tooth that I filled was with non-cohesive gold cylinders. Hand pressure in gold fillings is a lost art, yet it is the proper way to pack gold at the cervical margin until you get a sufficient layer to protect that margin. I can make a thoroughly condensed filling by hand pressure. The starting of fillings and the protecting of margins should be done with non-cohesive gold, then wedging in the cohesive gold, which should be as heavy as No. 10 or 20, because it does not require so much pressure to condense that gold when laid flat as a lighter weight when it is fumbled into a bunch and annealed. There came into use at one time heavy golds, from 60 to 140, and many operators adopted these. We started with what is still being advocated —drilled retaining pits—but they took a great amount of time. I have heard that the only valid objection to the use of non-cohesive gold at the cervical margin is that in cases of pyorrhea, where men are scraping the deposit, they would disturb the edges of the filling. There are some bunglers, but I should not think many would do that. The abuse of disks and strips at the cervical margin should be condemned. Use a coarse disk and then look at the cervical margin just above the filling; you will have roughened it and made a bad piece of work. Disks are of value, but they must be used with care. The finishing of the contour of a gold filling is a most difficult piece of work.

Dr. C. N. Johnson, Chicago: This is a clear, conservative paper, and it comes from a man who may speak with authority. If the profession generally had been in the habit of inserting gold fillings along the lines the two gentlemen who have spoken have done for all these years, the complaints about the want of durability and efficiency of gold fillings would never have been urged against them. It has been my pleasure to see gold fillings from these two gentlemen that have been doing good service for many years, and I shall

be very proud of the record of the best inlays if after such a long test they still do the same good service. I believe that inlays have a very important field in operative dentistry, and that many expert gold fillers do not yet recognize their range of usefulness, but I do not like to see reflections cast upon the efficiency of gold fillings, when as a matter of fact those reflections should apply not to the material but to the operator. I have gone into inlay work very extensively because I thought it my duty, and have inserted inlays in almost every conceivable kind of a cavity in order to test this matter as thoroughly as possible. My chief objection to the extreme statements made by inlay men is that not enough time has elapsed in which to make extensive observations of inlay work and pass judgment on it. I am exceedingly pleased with this kind of a paper because it makes us think and gives us a broader view of the entire subject. It requires a broad mind to choose the proper method in each case.

Dr. J. E. Nyman, Chicago: This question of incompatibility of gold rather amuses me, unless we are going to admit that certain chemical changes take place within the gold filling that destroy the tooth structure. The only possible ground of incompatibility that can be claimed for the gold filling which will in any way endanger the tooth is the fact that it is a very good thermal conductor, and if proper precautions are not taken to preserve the pulp from thermal changes destruction of the pulp and an abscess are liable to result. But as regards the recurrence of caries about a gold filling from incompatibility of gold, that is fallacious. I have seen gold fillings put in by good operators that have preserved the teeth perfectly for years and years, and yet caries was a constant and progressive factor in some part of the mouth during all that time. There is no question but that the frequent recurrence of decay is due to improper finishing of the filling. That is the climax of the whole operation. The preparation of the cavity is the easiest part of the work, the insertion of the gold is the next easiest, but the finishing of the filling is the most difficult. Whether a gold filling or an inlay should be inserted must be determined largely by the shape of the cavity after you have removed the carious material and have broken down the weak walls to solid enamel supported by solid dentin. Frequently you find a cavity of such shape as will retain a gold filling without further preparation, but if you insert an inlay you must cut

away an immense amount of good solid tooth structure. I do not believe that the time has come for us to throw away our pluggers, nor should we believe in inlays for all cases. Every little while along comes some new departure and our enthusiasm sweeps us off our feet. We try to use the new method in every case until we learn just where it can be employed. When a cavity is suited for a gold filling that is the only thing to be used, and I feel certain when I have inserted a filling that I have done the best for that case. There is no question that inlays have a definite place in dentistry, but we have not dealt long enough with them to know what that place is. In many of these cases the gold inlay is the proper thing—where we wish to secure retention when a tooth is exposed to stress, or where a long operation fatiguing both patient and operator brings the latter to the point where he can no longer bring his best energies to bear on his work.

Dr. Don M. Gallie, Chicago: When I came into the clinic this morning I found only one man using a gold plugger and gold foil, and that man was Dr. Noyes. In this age of fads, fancies and follies it seems good to see a man sticking to something that has been tried and not found wanting. Two years ago everybody was a glass-blower putting in porcelain inlays. Today we hear of nothing but gold inlays. No doubt they have a place, but when you hear men say they will burnish a matrix of gold into a small occlusal cavity, I consider that bad practice. Many times you can fill a cavity with gold and have a properly protected margin, a filling that you know will preserve the tooth, while you are burnishing in the matrix. In an occlusal cavity, where the walls are strong enough, put in gold and you will have a filling that will last ten to twenty years. In a large complex cavity, where there is great strain on the operator and the vitality of the patient, we have a good place for an inlay. I think in a few years the tide will go out and carry with it many of those who are now enthusiastic for inlays, and the incoming tide will bring back the operators with the plugger and mallet, who will go on saving teeth as Dr. Noyes and Dr. Crouse have, and they will tell us that gold fillings are all right in the majority of cases.

Dr. E. H. Allen, Freeport: Up to this time I have not been fully convinced that so general an application of the gold inlay as advocated by some was a safe practice. Therefore I am still of the

opinion that for most of the cases that the average dentist has to treat the gold filling is yet the best method of stopping a cavity in a tooth. I think Dr. Noyes' paper sound in every particular. There is one feature of gold filling that I wish to speak of, namely, cement anchorage. I am not using this method extensively, but do employ cement frequently as a means of starting a filling, not, however, depending upon the cement for anchorage to any great extent. However, I will mention one case where cement was used as the principal anchorage. Had I here depended upon cavity preparation as a means of retention of filling the result would have been a very large, unsightly gold filling in a superior central incisor, involving the disto-proximal and incising surface. This was a case that would better have been crowned than filled had I depended upon cavity preparation to retain the filling. After obtaining a square seat at the gingival margin of the cavity, I spread a thin layer of sticky cement over the cavity, then quickly placed crystal gold on the soft cement, gently rubbed and packed the gold into the cement, waited until the cement had hardened, and then completed the filling. This was very nice looking, as gold fillings go, and what is better, it has proved to be durable.

Dr. Chas. E. Bentley, Chicago: As Dr. Johnson said, to be a safe man you must be broad enough to select the method that is suited to the case in hand. We are upon the crest of a new wave, and no one realizes that more keenly than I do. Of 150 or more clinicians before the Chicago Odontographic Society last year the majority gave porcelain inlay clinics. For this year's meeting I sent out forty invitations. Only two men selected porcelain inlays, and the majority selected gold inlays. What is the cause of this change and which has the greater claim to durability? Dr. Johnson says that the competent gold fillers are still putting in gold fillings. The same is true of the competent porcelain and gold inlay workers. In the face of the recent investigations on cements, we must depend upon the man who makes cement to give us a firmer attachment. But even with what we have there are some conditions, as yet unfamiliar to me, that permit some men who do porcelain work to have their inlays stick. In spite of what you may say, there is an adaptation that can be obtained in inlay work that is impossible with gold filling. The very best you can do with a gold filling is to adapt it to the walls of the cavity, but with an inlay absolute adhesion is pos-

sible. I agree with Dr. Gallie that in occlusal cavities there is no necessity for an inlay, as gold fillings can be placed there and do better service, but in the six or even ten anterior teeth I would place porcelain inlays, the conditions being favorable. In all compound or complex cavities posterior to that I prefer the gold inlay.

Dr. G. D. Sitherwood, Bloomington: I wish to emphasize two ideas—the value of the small plugger points in putting in a gold filling, and the value of gold and platinum combined. No fillings I have put in seem to be so satisfactory and permanent as the platinized gold fillings, especially in teeth exposed to great wear during mastication. As to the difficulty of finishing a gold filling, use your gold flat, fold the foil, use the old Varney fine serrated points, and you will have little trouble in finishing.

Dr. C. N. Thompson, Chicago: This paper is timely, for we need a check upon our inlay enthusiasm, and it is good to remember that we should keep pace with the progress in the manipulation of gold foil. The porcelain filling is gradually becoming the filling for cavities not exposed to stress, but gold, either in the form of fillings or inlays, is still best for occluding cavities. Gold fillings inserted with the exactness possible to Dr. Noyes are seldom seen. If there were more like them there would be less call for a filling retained and perfected by cement, as is an inlay. Cavities that need protection against thermal change are specially indicated for inlays, because the mission of the cement is protective as well as retentive and supporting. Gold foil fillings in strictly occlusal cavities are proving good practice, because when finished with platinum and gold foil they wear well, and they are so easily and quickly inserted that inlays are not called for.

I have yet to find use for a knife gold trimmer, because when used by any but the most skillful and painstaking operators, it can do a tremendous amount of harm. The use of an instrument cutting from the tooth to the filling cannot help drawing the gold slightly away from our carefully covered margins. Of course its intended use is to cut always from the filling to the tooth, but even in this manner it is possible to cut too deep and splinter the cavity margins, and the temptation is very great to hook the instrument under an overhanging cervical margin of gold and cut it up and away—a practice which cannot help defeating the intention of the operator.

Dr. Noyes, closing discussion: The chief purpose of my paper was to lay down very broadly some rules by which we may determine whether we will put in a gold filling, a gold inlay or something else. There are many cases in which we could do either of three or four more things, and we must train ourselves to a sound judgment as to which we will do. It seems to me that we have been training in the West a school of operators who are likely to save us in the matter of gold fillings. I do not know what they are doing in the East, but I feel like congratulating some of the Western schools on their raising up competent operators in gold.

DENTAL EDUCATION.

BY C. L. GODDARD, B.A., D.D.S., SAN FRANCISCO. READ BEFORE THE CALIFORNIA STATE DENTAL ASSOCIATION, AT SAN FRANCISCO, MAY 16-18, 1904.

As the writer has recently completed the thirtieth year of practice, it will possibly be interesting to compare dental education at the time he was a student with what it is now. I hold in my hand the first dental college announcement that I ever saw. It was published in 187—. Let us see what were its requirements, for they were the same as those of all dental colleges of that time. The requirements for admission were a good moral character and a five-dollar matriculation fee—the latter being the more important. The course of instruction extended over two courses of four months each.

The requirements for promotion from the first year's class to the second were a receipt for the first year's tuition and a check for the second. The student attended the same lectures in the first and second year. What he did not learn in the first session he was supposed to learn during the second. There were no recitations, but quizzes were occasional. Students who wished to be quizzed were told to take the front seats in the lecture room. Sometimes these seats were about as full of juniors as of seniors. Lectures were given on Anatomy, Physiology, Chemistry, including a little Materia Medica, Mechanical Dentistry and Operative Dentistry, including a little Pathology and Therapeutics. Some lectures were given during ordinary hours, but six times a week lectures were given from five to six p. m., and three times a week

from eight to nine. There was no dissecting unless a student dissected voluntarily in a medical college and paid extra fees for it; no technic work of any kind; no microscopy, histology nor bacteriology. No record was kept of attendance at lectures or clinics. None was necessary, for students went to college then to learn what they could, not merely to get a diploma.

Dental clinics were given Saturday afternoons and surgical clinics at the hospitals Saturday mornings. Both were well attended. At the close of the second year each student was required to show one gold filling and one artificial denture in the mouth of a patient, and present one artificial denture for the museum. The college furnished rubber, wax, teeth, plaster, lathes, gold foil, amalgam, cement, guttapercha, one blowpipe and two vulcanizers for a hundred students. During the first year (of my attendance) one student only had a dental engine—and wouldn't lend it. During the second there were two or three, but the writer had none till after all his graduating work was done. Many practitioners, even, were afraid to use an engine lest the tooth be cut too rapidly. Whoever wanted to use rubber dam furnished it himself. At the first clinic of the session the dean filled a distal cavity in a lower bicuspid without the rubber dam and without a saliva pump. The first gold fillings by the writer were inserted with the same lack of present necessities.

In those days there were no gold crowns, except on the heads of kings. Students were taught to attach a porcelain cuspid or incisor to a root with a wooden pivot. One lecture was given on a method of attachment with a split metal post in a gold box previously inserted in the root, but the method was so complicated that no student tried it. Bicuspid crowns were unheard of and molar crowns not even dreamed of unless in the mouth of a nightmare.

Dentists of five years' practice, including time of pupilage, were graduated at the end of a term of four months, and one of my classmates was a month late in beginning. Another modest and unassuming junior, with some office instruction, discovered about a month before the end of the term that he had been a senior all the time without knowing it, under the five-year clause, and graduated at the end of that month.

As the writer had, just before entering dental college, com-

pleted a four years' classical course of nine months each, for which a full high school course had been necessary for admission, and during which strict attendance was required from half past seven in the morning for seven days in the week, it was difficult for him to take the dental course seriously. It seemed a farce almost in comparison, and yet before completing it he found more tragedy than comedy. The students were an earnest lot who went to college to learn, went for opportunities that could not be had elsewhere. Our professors had the capacity of imparting a great deal of instruction in a little time, and we made the best of our opportunities.

Although in those days many dentists graduated only from private offices and became good practitioners, yet it was possible to obtain instruction more quickly and more scientifically from the colleges. They gave what they could, we absorbed what we could, then gained experience from practice. A patient then had to be truly patient and be thankful when the ordeal was over.

For several years after the period described dental educational methods were about the same, but first one college and then another added a month and then another to the course, but the progress was slow. As late as 1883 only three dental colleges required an examination for admission, and the Dental Department of the University of California was one of the three. In 1884 only two had a nine months' course, and the same college was one of the two. In 1886 only three required three years' study before graduation, and modesty almost forbids me to add that the same institution was again one of the same small minority. The requirements for admission have been gradually increased to two years of high school work, while some colleges, beginning with 1904, will require a full high school course.

During the past year the principal discussion in educational centers has been the four years' course of seven months each. While that plan was adopted by the National Association of Dental Faculties, many have come to the conclusion, which the writer had already expressed many times, that a three years' course of nine months each is a better plan. The number of months of instruction is about the same, and the writer does not see how it is possible to give any more instruction in twenty-eight months, spread over four years, than in twenty-seven months, condensed into three,

especially when we take into consideration the time lost at the beginning of each session, which must be greater in four sessions than in three. An extra year is taken from a young man's life without giving him extra instruction or compensation. During the four years' course there will be fifteen months of vacation. Dr. F. L. Platt expressed it very nicely at the Institute of Dental Pedagogics when he said: "In the four years' course there are fifteen months of idleness, whereas in the three years' course of nine months there are only six months of idleness during which little attention is paid to dentistry."

It is claimed by some schools that their climatic conditions are such that a nine months' course is impossible, but they made the same plea when the course was changed from six months to seven. If they prefer to spread their instruction over four years let them do so, but let other colleges have the privilege of giving it in three years, during which the six months' vacation will furnish the student sufficient time for recuperation.

In the Institute of Dental Pedagogics Dr. G. V. Black said, in advocating the four year plan, "The demand among our people is for educated men; better men than we can properly prepare in the three years of time *of the material we must take into our dental schools at the present time*." (Italics mine.) There is the trouble! Lack of proper material to work upon. Two years of high-school work is not now enough. All dental colleges should require the full high school course. The same preparation should be required for admission as to colleges of Natural Science in the Universities. A year or two of Latin is required in several dental colleges. Chemistry and physics should also be required as preparatory, then the time usually spent on them in the dental course can be spent in higher studies.

Students that enter with less than a high school education must do more or less high school work in the dental college. Elementary chemistry, didactic and practical, is a high school study, and if a student has had a year of such study in a high school he should not be required to repeat it in the dental course, but should immediately be given advanced work—dental chemistry. In high schools at least four hours a week are spent in recitations or lectures and six hours a week in the laboratory. Most dental colleges have two or possibly three hours of didactic work, with

seldom more than four in the laboratory. I believe that the year of high school chemistry amounts to more than that of the first year of the dental college. Physics is also a high school study. It is proposed to include it in the four year dental course, but if a student has already had it before admission he should not be required to repeat it. Our high schools are equipped with physical laboratories, but our dental colleges are not. Why should physics be added to the dental course when it really belongs to the high school? Manual training is also high school work. A student that has had such a course in preparation will do his dental technic work quicker and better than one that has not. In high schools and colleges the average requirement for a year's work is four studies of five hours a week, or the twenty hours of each week may be spent on a greater number of studies with less hours each, but averaging the same. Physics and chemistry thus constitute in themselves half a year's work. If a student has had that in the high school he does not need it in the dental college, but should be given advanced work.

At the Pedagogic meeting referred to Dr. Black said that many of the rules of the N. A. D. F. were unjust—for instance, the rule refusing credit for time spent in a medical school unless the whole course were finished. This rule seems especially unjust when we take notice that the principal studies with which a medical course is accredited are given in the first two years.

Some attention has been given to the "count system," by which credit should be given for proficiency in a study without regard to where it was taken, whether in a high school, scientific school or medical college. That is the rule in other colleges and should be the rule in professional schools. If a student can show that he has satisfactorily pursued any subject of the dental course he should receive credit for that subject. If there are enough of these to equal a year's work, his course should be shortened by that much. If he can be accredited only with less than that, let him be excused from those studies and be allowed to pursue advanced or research work. By that means the spirit of investigation will be fostered and encouraged. If the count system is adopted, as it should be, it will provide for the "college man" whether he has the degree of B. S. or B. A. or whatever his degree may be. If his course of study includes subjects that are paralleled by the dental course he will receive credit for such work in accordance with its extent.

Coordination of courses.—In some universities that have medical departments a coordination of courses has been arranged, so that a student desiring a course in science before the medical course may take two or three years of science, then begin his medical studies. When his work in the medical department has been sufficient, in addition to his previous work, to amount to four years of science he will receive the degree of B. S., and at the end of his medical course will receive the degree of M. D. Thus a year or two will be saved, for by so overlapping the courses both degrees can be obtained in six or seven years instead of eight, which would be necessary to complete both courses separately. Universities with dental departments can do the same thing. Let the requirements for admission to the dental department be the same as for the department of natural science, then a student at the close of his high school course can enter either. If he wishes to take the dental course only he can do so. If he wishes a course in science also he can remain in that department two or three years, then attend the dental department two or three years, and receive the degree of B. S. and D. D. S. whenever his work entitles him to do so. A coordination of the medical and dental courses can be made in the same manner, so that a student by receiving credit in each department for the work in the other may receive the degrees of D. D. S. and M. D. whenever his work entitles him to do so. In such a case the dental course should be taken first, for manipulative ability should be acquired as early as possible.

Discussion. *Dr. F. L. Platt,* San Francisco: I agree with the suggestions Dr. Goddard has made, and only wish that they could be embodied in the rules of our schools and in the rules of our National Association of Dental Faculties. It was my pleasure to attend a meeting at Buffalo this winter at which this question of the three and four year course was discussed. So far as I am aware, not one argument was presented to support the four-year course. Dr. Black begged the Association not to take a backward step when they had tried so long to make a four years' course, but didn't say why it would be a backward step to go back to three years and make the course nine months in each year. No one had anything to say in support of the four years' course, except that they had it and it would be a shame to relinquish it. Later on I was talking to the dean of one of the largest schools in the

East. I asked him if the true purpose of the four year course was not with the idea that it would close up some of the smaller schools and increase the revenue of the larger ones. He said: "Certainly, Doctor, that is just what it is." I said, "Doctor, it may not be the proper expression here, but out in California we call that graft." He said, "I guess that is what it is." He said that a four years' course, taking a school with 500 students, meant an increase of $50,000. That is quite a nice little item. It does seem to me that everyone who has at heart the welfare of the students and the welfare of our colleges should use his influence to bring about the adoption of the three years' course of nine months in each year. It is better for the student, better for the profession, better for every interest at stake. Another thing should be attended to—that is, to impress the public with the idea that the dentist should be an educated man. Within the last three weeks I have been approached by three different parents asking me if their boys could enter the dental college, and what the requirements were. In every case I found that the boys who wanted to enter the schools had not taken more than one year of high school work. They seemed greatly surprised to think more than that was deemed necessary or called for in any way. They seemed to think that a man who could read and write English passably well was fit to enter the college and to practice dentistry. That idea should be done away with, and people certainly should be impressed with the idea that we need education to begin with. Dental colleges are not the places to teach men to read and write English.

Dr. W. A. Knowles: I was not among the students of thirty years ago, but I can speak for about twenty-seven years ago. At that time in addition to the $5 fee they required a high school education in the medical college in which I was. The method of education then as compared with the education at the present time had some advantages, in that it taught the student self-reliance. As Dr. Goddard has stated, it was not necessary to have a roll call of the students, because they attended for the purpose of learning. I think Dr. Goddard himself is an exemplification of the success of that old-style course, which was not without its advantages, judging from the products it has yielded among the older practitioners.

Digests.

DETERMINATION OF THE NORMAL ARCH AND ITS APPLICATION TO ORTHODONTIA. By C. A. Hawley, D.D.S., Columbus, Ohio. Abstract of paper read at the International Dental Congress, St. Louis, 1904. In considering cases in orthodontia where the teeth are malposed and the form of the arch consequently distorted the question naturally arises, "What is the proper arch for these teeth?" If they are normal and uniform in size there must be some particular arch for them which they will exactly fill, and its form and the position of the contact points and occlusion be correct. Heretofore the judgment of the eye, trained by observation of what seems to be the most perfect specimens of nature's work, has been the only guide, but human judgment of this kind is apt to err and the object of the investigation described in this paper is to find some data that will be accurate and exact and form a trustworthy guide.

Dr. Bonwill, in his valuable work on the articulation of the teeth and the movement of the jaws in mastication, outlined the geometrical principles on which the movements of the jaws are based, and the form of an ideal arch. This arch is constructed upon the equilateral triangle and with slight modifications has been universally accepted as correct and forms the basis of the most advanced teaching on this subject. It is shown in the familiar illustration (Fig. 1), the base A A representing the distance between the condyles, the apex of the triangle resting between the central incisor teeth at the cutting edges. The six front teeth are arranged in an arc of a circle the radius of which is determined by the combined widths of the central, lateral and cuspid teeth. From the distal point of the cuspid the bicuspids and molars are arranged in straight lines passing to the extremities of the base of the triangle, the points of the buccal cusps being cut by the line. The line drawn through B passes through the middle point between the buccal cusps of the first molar teeth. In commenting on this arrangement of the teeth, the author of the articles on the subject in *"The American Text-Book of Prosthetic Dentistry,"* from which the drawing is taken, says, "In natural dentures the second and third molars are turned slightly toward the median line and the line

drawn through B more often passes through the crest of the disto-buccal cusps of the first molars." These modifications are, I think, generally accepted as correct.

In the practical application of this form of arch to the arrangement of artificial teeth Dr. Bonwill constructed an articulator upon the basis of a four-inch equilateral triangle, this being found the average width between the condyles in an examination of a great number of skulls, the width varying from three and one-half to five inches. The casts were mounted on this articulator in such a manner as to copy the form of the natural denture. In setting the teeth the centrals, laterals and cuspids were arranged in the

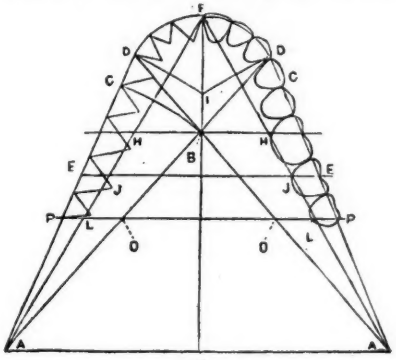


Fig. 1

arc of a circle, the radius of which was determined by their widths. The bicuspids and molars were carried back in a straight line not exactly to the base of the four-inch triangle represented by the articulator, but moved inward or outward to bring the stress of mastication as nearly as possible over the ridge, and still preserve the proper lateral movements of the jaw as represented by the articulator. The exact width between the molars is thus determined by the judgment of the operator or the conditions or position of the ridge. Unless this were done narrow teeth arranged in a four-inch triangle would be too wide in the molar region, and, *vice versa,* wide teeth too narrow.

In orthodontia we meet a different problem. We have presented a set of teeth to rearrange in the living subject. We can determine the exact widths of the teeth. There is no means of measur-

ing the width between the condyles with any degree of accuracy, and we cannot place them in the average arch based upon the four-inch triangle. The arch must be found from some other data and we will select the front teeth. Take as an example any case, and from the combined widths of the central, lateral and cuspid as a radius draw a circle A H C (Fig. 2). Measure the radius upon the circumference of the circle at H and J, marking the distal points of the cuspid teeth. From C, the end of the diameter of the circle, drawn through A and B, draw the lines C D and C E through H and J, extending them indefinitely. Draw a tangent

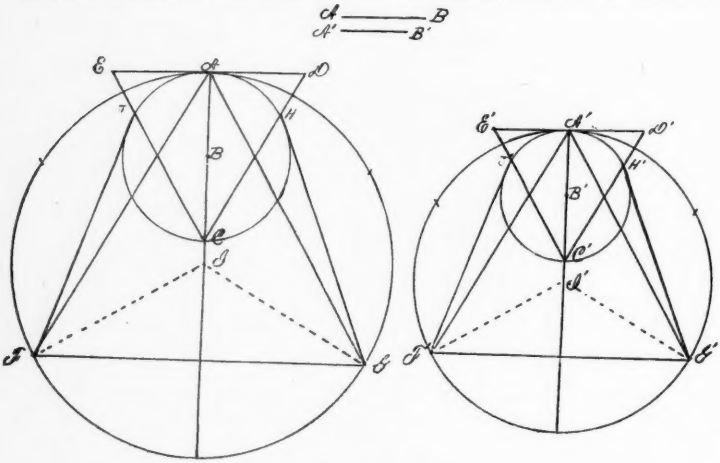


Fig. 2.

to the circle at A, cutting these lines at D and E and forming the equilateral triangle C D E. Take one side of this triangle as the radius of a circle passing through A with the center I upon the extension of the line A C. From A mark off the radius of the circle upon the circumference six times and draw the inscribed triangle A F G. Draw the lines F J and G. H. We have now an arch based upon and arranged with an equilateral triangle, but proportional to the widths of the three front teeth or the radius A B.

To prove that such diagrams will always be similar and proportional to the radii, from the radius A′ B′ draw another diagram

supposed to represent a smaller set of teeth. In similar triangles the corresponding dimensions are always proportional. The triangles C D E and C′ D′ E′ are similar because they are both equilateral. They are constructed upon altitudes A C and A′ C′ equal respectively to twice the radii of the circles A H C and A′ H′ C′. Therefore the base E D is to the base E′ D′ as the radius A B is to the radius A′ B′. But E D and E′ D′ are by construction equal respectively to the radii of the circles A G F and A′ G′ F′. From the centers of the latter circles draw I F, I G, I′ F′ and I′ G′. The

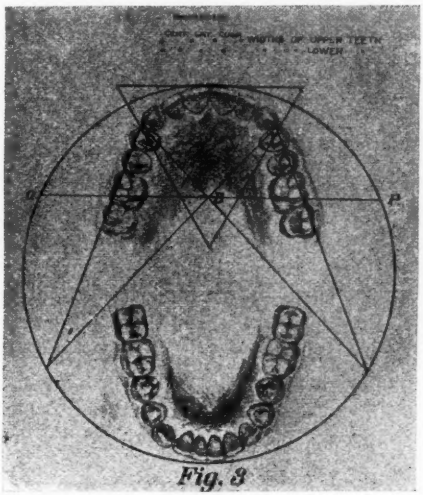


Fig. 3

triangles I F G and I′ F′ G′ are similar since they are equiangular (A F G and A′ F′ G′ being equilateral triangles). Therefore F G is to F′ G′ as I G is to I′ G′ or as E D is to E′ D′ or as A B is to A′ B′. Or if the arch presented is an ideal one we may from any widths of teeth given construct a similar arch proportional to the given set of teeth.

Having the arch drawn, the teeth may be laid off on it, with a pair of dividers from measurements on the plaster model, thus locating their exact positions as shown in Fig. 3. In this figure the widths of the teeth are marked above the arch. They are actually marked by needle points in the paper, but here are inked in

order to show better in the photograph. In measuring off the front teeth there is a small space about one-thirty-second of an inch between the cuspid and first bicuspid. This is because the widths of the teeth are taken in a straight line and are measured off on a curve. Notice that the line O P passing through B parallel to the base of the triangle passes through the crest of the disto-buccal cusps of the first molars. I have found this true of every case that I have drawn. Variations in the proportional widths of the bicuspids might cause it to vary slightly, but I have not yet found such a case. The second molars are turned slightly toward the median line. The lower arch is drawn from measurements of the lower teeth.—*Items.*

WHY DOES DENTAL CARIES OCCUR MORE FREQUENTLY IN THE FEMALE THAN IN THE MALE MOUTH OF THE HUMAN FAMILY? By W. G. Ebersole, M. D., D. D. S., Cleveland. Read before the Cleveland Dental Society. Our title is, as you see, an interrogatory one. We may say that it is both positive and interrogatory; positive because it states that certain phenomena exist, interrogatory because it calls for an explanation of these phenomena. In view of the fact that a most careful examination of the literature at our command fails to reveal anything that tends to support the statement, it becomes necessary first to show that dental caries does occur more frequently with woman than man, and then later take up the study of the phenomena which produce this condition. A somewhat extended inquiry among our colleagues revealed an impression that there is a decided difference between the two sexes in this matter, but none knew of any data that had been gathered to prove it, nor of any literature bearing upon the subject, except two articles upon the seeming influence of pregnancy, together with a few brief statements made by different writers in this connection. The articles referred to are: First, one in *Cosmos* of April, 1895, by Reuben Paterson, entitled "The Influence of Pregnancy Upon Dental Caries;" second, by I. C. Edington, entitled "Secretions of the Mouth During Pregnancy" (DENTAL DIGEST, Oct., 1901, p. 800). Both the articles are of merit, and should be read by those interested in this question. Neither, however, has any direct bearing upon the side of the subject which we are discussing. Our attention was first called to this side of the question

a number of years ago, when employed almost exclusively in the removal of teeth. We were particularly impressed by the large number of women as compared with the number of men requiring our services. Later, when we became more closely associated with the preservative and restorative side of our professional calling, we again noted the very marked difference.

Ratio of Sexes Treated.—Through the kindness of a number of our elder brothers in the profession, we are by their records able to show just the percentage of work done for the two sexes in a period extending over a number of years. The first record submitted is from a practice almost exclusively operative, and shows that 39 per cent was for men and 61 per cent for women, a difference of 22 per cent. The next is a record of a general practice, and shows five men to every eight women, or 38½ per cent of men and 61½ per cent of women, a difference of 23 per cent. Then we have a record of 1,514 patients, covering a period of five years in one of the oldest general practices in the city, which shows that 591 of the patients were men and 937 women, or practically 39 per cent and 61 per cent, again showing a difference of 22 per cent. The next is exclusively a prosthetic practice, embracing some 904 patients. We find that 710 are women and 194 men, or about 78½ per cent women and 21½ per cent men—a difference of 57 per cent. But the actual work completed, based upon the charges, shows that but 64 per cent was for women and 36 per cent for men—a difference of only 28 per cent, or a gain for men of about 50 per cent of the difference in cost of work completed, as against the number having work done.

This difference may be explained by two facts: First, where caries exists in man he is less careful about having his teeth cared for, and if troubled resorts to extraction rather than submit to filling. Second, when he is having work done he wants the very best that his income will permit him to obtain, while the woman saves all teeth possible, and when compelled to consult our prosthetic brother she has just as little to be done in his line as possible; and inasmuch as "John" is to pay the bill she wants it done just as cheaply as is consistent with good, serviceable work.

In our own practice, exclusive of the surgical side, considering simply the operative part of it, for four years and a half we find the percentage runs 63 women to 37 men—a difference of 26 per cent.

The investigation of the records of some 31,863 extractions made prior to and during our practice in this city reveals the fact that about 77 per cent were for women and 23 per cent for men—a difference of 54 per cent. The examination of our records made since locating in the city shows the ratio to be about seven teeth for women to three for men, or a difference of 40 per cent. Thus we find that when all branches of the dental art are considered, woman demands from 22 per cent to 57 per cent more of our work than man; or to be more explicit, taking the general average, we find woman demands about 33 1-3 per cent more attention at our hands than does man.

Having established the above fact, we turn to the second or the interrogatory part of the subject; the part that concerns us the most—the why? A close study of the phenomena pertaining to or bearing upon this phase of the subject directly or indirectly makes us fully cognizant of the impossibility of attempting an intelligent explanation of them all in a paper occupying the time limit of the society. Consequently we have determined to devote the remainder of this paper to setting forth some of the causes without attempting to enter into a full explanation of the physiological or pathological activities that enable them to produce certain results, closing with a brief statement of some of the theories which our study of the physiological and pathological phenomena have produced within us, reserving a fuller discussion for the future.

Influence of Generative Organs.—It is our intention to devote the greater part of this paper to a discussion of the influences exerted by the female organs of generation. First, because our investigation along this line has led us to believe it is the most important cause of the existing conditions, and second, because less thought seems to have been given to this side of the question.

But in turning our attention in this direction we must not lose sight of the fact that there are numerous things which may and do wield considerable influence in bringing about existing conditions, which should be kept before us in our endeavor to explain other phenomena. There seems to be no doubt that our present mode of living is so radically different from that intended or desired by nature that she is unable to successfully perform all her normal functions. If this be true, then man, from being a purely physiological, has become to a greater or less extent a pathological being.

While this applies to either sex, it is most marked in the female, sometimes called the weaker sex.

Influence of Tobacco.—Man, through the responsibilities and obligations placed upon him, is more in the open air and receives or obtains a greater amount of physical exercise, which from a physiological standpoint tends to prevent pathological conditions. Man again is given to the use of tobacco, which is claimed by some to prevent caries of the teeth to a greater or less extent. How great an influence it may exert we are not ready to say. We are prepared, however, to say from personal observation and investigation that it is a rare thing to see a healthy mouth where tobacco has been used immoderately for a short period, or moderately for a long period of time. This statement is made only after devoting considerable time to investigating the question, and after having examined many mouths of tobacco users that were not presented for professional treatment. We have seen a number of mouths which were free or comparatively free from dental caries, but we have found a healthy mouth only in two or three instances, and then only where the weed had been used in moderation for but a few years, and where the man's calling was such that he was compelled to use every precaution to remove all taints and influence, that his patrons might not be discomforted or offended by the obnoxious odor. The smoking or chewing of tobacco does in time produce pathological conditions of the oral cavity, but we must admit that during its early and moderate use it also seems to prevent caries.

Woman's Disadvantages.—On the other hand, woman's environments are such among the civilized nations that she as a rule is but little in the open air, and the physical exercise is so meager or taken under such circumstances that it avails her but little. Then, again, woman is given to indulging in sweets, candies, pastries, etc., at all hours and at most inopportune times, which, aside from any direct influence they may have upon the teeth, tend to produce digestive disturbances, which in turn alter the condition of the various secretions, thus wielding a very decided influence indirectly upon the teeth.

Aside from this, woman is physically weaker and more susceptible to outside influences. This is so greatly increased by the manner of dress that it has now become a rare thing to find a woman sound physically. In speaking of dress in this connection we refer more

directly to the use of the corset, which in the past and to a less degree today has been and is being used, through the so-called pride of woman, to give her a nice form at the expense of the perfect development of the pelvic organs. So much has this evil been practiced that it is a wonder to us that many of the organs attempt to perform their normal functions; particularly is this the case when we consider the efforts made by most women to hide as long as possible the fact that they are about to become mothers. The fad of lacing has been practiced so long and persistently that we not only have the distortion and displacement produced by the actual application of the corset, but its influences have been handed down from generation to generation, until at present most of our girls have more or less faulty pelvic organs and a misshapen pelvis.

The natural weakness or susceptibility of woman, together with that caused by folly, fad and pride, make her also the most frequent consultant of the physician. This, too, may and often does lead to the consultation of the dentist, not at the suggestion of the physician, but due rather to his inconsiderate use of remedies that are injurious to the teeth. We are sorry to say that many physicians prescribe both iron and acid without any consideration for the teeth.

There is another reason for the greater number of women as dental patients, and that is the cosmetic or esthetic side of the question. To men personally this usually means little, but to women it means much.

But after a careful study of the foregoing reasons, and after allotting to them what we feel positive is ample credit for all influences exerted, we yet feel that there still remains a large percentage owing their dental caries to causes entirely different from those already considered, and yet these causes may and undoubtedly do lend their aid to the condition we are about to consider. After the most careful observation and investigation the writer is led to make the statement that it is the activity of the female reproductive organs that wields the greatest influence in the matter, either directly or indirectly. This we believe to be true whether the activity be during the periods of menstruation, gestation or lactation. Many writers have hinted at the influences that pregnancy bears in this relation, but thus far no one, so far as we have been able to learn, has taken into consideration the influences of the menstrual period, or the period of lactation. A somewhat extended investigation along this line has led us

to believe that these two functions also exert a very important influence, standing second only to pregnancy. That there is a universal belief that teeth decay more rapidly during pregnancy seems to be beyond question, but we fail entirely to find any recorded data which would tend to support that theory; therefore let us first prove this to be a fact.

Influence of Gestation.—It has been the writer's privilege to care for many patients who have been referred to him by a number of physicians for treatment during the period of gestation, thus affording an excellent opportunity to study this trouble. Clinical history and observation have proven beyond a doubt that here lies the great cause. We will cite a very few of the many cases.

Case 1.—Miss D., age 22, in excellent health. Examination of oral cavity showed mucous membrane healthy; teeth beautiful, and kept in good condition. Careful examination revealed one small amalgam filling six years old and three small cavities. Oral secretions alkaline. Filled and cleaned teeth; saw patient again in six months; mucous membrance, teeth and secretions all in a first-class condition. Six months later again examined mouth; patient had been married about five months; teeth and mucous membrane in good condition, but secretion slightly acid. She left the city, and we did not see her again for thirteen months, but in the meantime she wrote, saying that her teeth were getting very sensitive at the gingival margin, and that she could not keep them clean. Inquiry revealed the fact that she was in the sixth month of pregnancy. Prescribed with seeming relief. When examined again, thirteen months after the last examination, her baby was five months old, and nursing. Found mouth very unhealthy, and a number of teeth carious, three of the amalgam fillings leaking, mucous membrane congested, gums soft, spongy, and bleeding upon the slightest provocation, secretions decidedly acid. Filled teeth and placed upon a course of treatment, which soon relieved the trouble, and for two and a half years there was no recurrence. Presented at the end of this time with mucous membranes and secretions normal, but with a fracture of one of the walls of a molar containing a large amalgam filling. There was no decay.

Case 2.—Miss S., age 19, stenographer; fine physique and excellent health; a beautiful girl; never had consulted dentist before. Presented with odontalgia of three days activity. Examination

showed exposed pulp in left superior first molar. No other cavities in a very beautiful set of teeth; mucous membrane healthy, except where blistered in seeking relief. Treated and filled teeth. Subsequent examinations during two and a half years showed normal secretions and no perceptible changes in teeth. At the end of this time married, and in eighteen months presented for examination. She was a mere shadow of her former self, and the mother of a six months' old baby. Examination revealed a horrible condition of the oral cavity. The entire mouth was diseased. Examination of the teeth revealed two exposed pulps. The eight superior anterior teeth all had extremely sensitive cavities at the labio-gingival margin. The inferior cuspids, bicuspids and first molars showed the same condition, while the incisors and superior second bicuspids showed a very decided white line at the gingival margins. The decay here was of the typical white kind; secretions were very decidedly acid. Placed upon treatment with very decided benefit.

Case 3.—Miss C., age 23; good health; mouth fairly healthy; teeth showed a number of fillings; four teeth missing; secretions slightly acid; several teeth needed filling. Filled the teeth and put on treatment. Subsequent examinations showed a slight acidity of the secretions except at menstrual period, when the acid condition was very decided. For two years no further trouble except requiring treatment for acid condition. Married, and in ten months gave birth to a son. Treatment followed during early and later part of pregnancy, with the result that there has been but little trouble. Treatment being obnoxious, was neglected until teeth became sensitive at gum margin, when it was resumed under protest. Results showed loss of tooth substance at gingival margins, a typical white line showing on a number of the teeth and with four small cavities.

Case 4.—Mrs. L.; referred; second pregnancy; six months. Examination showed exposed pulp in upper first molar; four other cavities; four teeth filled; saliva decidedly acid; mucous membrane hyperemic; gums bled easily, etc. History: Had never had any trouble until after first child was born; had four teeth filled following this, and located small cavity in molar. Two and a half years passed, with the result as given above. Treated teeth; placed on alkaline and prophylactic treatment, with arrest of trouble.

Case 5. Mrs. F.; referred; second pregnancy; seven months, Examination showed two exposed pulps, some old roots, several

filled teeth; secretions decidedly acid; mucous membrane hyperemic. History: Never had trouble with teeth until during and after first pregnancy.

We could cite case after case of this kind, but have selected only a very few of the typical ones. We rarely have a married woman patient but that we get the history of the number of pregnancies, if any, and the condition of the teeth prior, during and following that period. A large majority have but little trouble prior to that period, many tracing it to that time, and all of them notice a very marked increase in the tendency along that line.

Of lactation all we need say is that we find the marked acid condition of the secretions and the decay seem to continue all the time.

Influence of Menstruation. Of the influence of menstruation there has been nothing written, nor has the matter been discussed so far as we can learn. From observation and clinical experiments we are convinced that this function wields an influence second only to that of pregnancy and lactation in both the length of time and the degree of the disturbance produced at the time. The average woman menstruates about sixty days each year and one hundred and twenty days in two years. The average period of gestation or lactation is about two years, or seven hundred and thirty days, which is six times greater than the time consumed in the menstrual periods. The intermittency of the menstrual period prevents its ever becoming as important a factor as pregnancy or lactation, because each period is of so short duration that the disturbing phenomena do not get an opportunity to develop to a stage sufficient to make any marked difference, and yet the repeated occurrence even with a mild action is sufficient to make its influence very marked as the years roll by.

The time when the influence of this function may be most noticed is when childhood ends and womanhood begins, or rather that period which lies between the two. We have seen patients whose teeth were perfect, or comparatively so, before the little systems became disturbed by the approach of the menstrual period, and yet have seen the little patients return shortly after this stage and found that their mouths had undergone a complete change. The teeth presented the same condition that is found during or following a pregnancy, caused by the general systemic disturbance which the change from child to woman produces.

To the mind of the writer menstruation is but the activity of dis-

appointed nature in keeping the reproductive organs from losing any of their functional powers due to inactivity, and the conditions which exist then are typical of those occurring in pregnancy as far as the influence bears upon the side of the question that interests us, except that it is very much less in degree of activity. We have a number of cases that will support this idea, but time will not permit our recording them here.

If we have proven that women lose their teeth more rapidly than men or that they decay more frequently, and have also proven that menstruation, pregnancy and lactation occupy an important place in the cause of this condition, it then becomes our duty to learn if possible why, and following this to find the means of preventing it.

Alterations of Secretions.—We believe that in physiological woman the oral secretions are always alkaline in reaction, but in the woman of today, in whom so many pathological conditions exist that a number of the normal physiological functions are or become pathological, we find this condition changed. We find the chemical reaction of the saliva ranging from slightly alkaline to decidedly acid. The same may be said of man, in whom many of the same causes exist, but the condition occurs less frequently, and when it does it is many times of a very different nature. Where the change in the condition of the secretions is due to causes other than the influence exerted by the female generative organs, then the results are the same in both sexes, but should not be discussed in this paper except to state that in man the size and structure of the dental organs require a longer and stronger activity. Where the acidity can be traced to the derangement of the female organs of generation there is to the mind of the writer a more marked difference in the results, and especially is this true during menstruation, gestation and lactation.

At this point we wish to answer in part the questions which have been raised by Dr. I. C. Edington when he says: "I cannot look upon pregnancy as anything but the natural way of reproduction, and as such it must be normal, and if normal it cannot be pathological, and if not pathological how can the secretions be perverted to the degree of destroying useful organs?" Our reply is, pregnancy is a physiological and not a pathological process. Menstruation and lactation are also physiological and not pathological manifestations of the female organs. They may not in themselves

produce pathological conditions when surrounded by that environment which nature gave and intended should be maintained. The trouble is not in the activity of these functions themselves, but is due to the abnormal conditions under which they must perform their duties. In this activity there is a greater demand upon the system, and the perfect physiological body knows no pathological influence at this time. Women of today, particularly American women, and more especially those of our cities, are in a condition physically due to the practices of the past and present that requires a decided effort on the part of the general system to prevent the inroads of pathological conditions. In fact, pathological conditions exist in the majority of cases. Is it any wonder, then, that the healthy but overtaxed woman shows pathological tendencies or conditions when called upon to meet this extra strain, or that the pathological conditions become much more marked where they already exist?

The examination of a large number of mouths, both by the writer and at his request by a number of specialists, particularly Drs. H. H. Powell, F. A. Burke and F. S. Clark, of this city, has failed to show a single case of pregnancy in which there was not an acid condition of the oral secretions. These examinations also showed that the degree of acidity increases as the period of gestation advances, and that the acidity extends through the period of lactation, gradually diminishing as the latter draws to a close.

It was in the menstrual period that we encountered so much difficulty in proving our theory. We could not make examinations ourselves that were at all satisfactory, and it was only after placing litmus paper in the hands of the patient, with instructions how to use it, that we got results which were gratifying. By this method we found that in almost every case there was at some time during the flow an acid reaction of the saliva. That this acid condition is pathological all will admit, but the question arises, does it normally occur? To prove our statement that these functions are not in themselves responsible, we have made or caused to be made an extended examination of the saliva of a number of the domestic animals, including the horse, cow, sheep, dog, cat, etc., and in no case was there found to be any difference in the secretions, whether during gestation, lactation, or in the interval between. In addition to this we had hoped to be able to show that among certain sects of the human race, who live and dress in the most simple fashion

and follow nature's laws most closely, the same results will be found, but our investigation here is not complete.

The above shows conclusively that gestation and lactation performed under normal conditions do not produce a faulty salivary secretion. Thus far we have proven simply that pregnancy, lactation and menstruation, together with other derangements of the female organs of reproduction, are the explanation of the decay or loss of the teeth of woman faster or earlier than in man. It was our purpose to attempt in this same manner to show how the secretions are affected, and why their action brings about certain results, but to enter into a full discussion of this phase of the subject at this time would be a hardship.

Let us continue then by simply stating what our experiments farther along this line have led us to think to be true. We believe that the acidity of the saliva existing during the activity of the organs of generation is the main cause or condition which makes caries more prevalent at this time. Black says: "Acidity may exist without decay, but decay never exists without acidity," and we agree with him. Who of us has not seen many mouths where there was a decided acidity of the oral secretions, and yet the teeth seemed immune as far as decay was concerned. We refer to those cases of rheumatic or gouty diathesis which give us so much trouble aside from caries.

We believe that the acidity is of a very different nature during menstruation, gestation and lactation from that found at other times, or that it is accompanied by a product of uterine activity, which in itself has the power to attack the lime salts in the body and prepare them for use in building up the osseous structure of the fetus. We might call it a sort of ferment. At present we are unprepared to say which is correct, but we have progressed far enough to feel that the acidity is assisted by this hitherto unrecognized substance or agent.

The cause of the change in the oral secretions is due to the change which takes place in the blood, and this is in turn due to both the selective and rejective powers of the uterine tissues and to the faulty activity of the nutritive functions, which seems closely associated or related to the conditions found in lithemia and osteomalacia, both of which are influenced and intensified during pregnancy.

Treatment.—Now a word as to treatment. This has been con-

fined mostly to antacid treatment, both local and general. We rely in the main upon local treatment, leaving the general systemic treatment more to the attending physician, with whom we frequently consult. The local treatment consists of the ordinary prophylaxis, followed by milk of magnesia morning and night in mild cases, using it oftener in the more marked cases of acidity. This rule applies to all cases, whether during menstruation, gestation or lactation. Our patients are instructed not to remove the deposit formed upon the teeth. This deposit is great or small just in proportion to the degree of acidity of the oral secretions. The systemic treatment has been of a twofold nature, prohibitory and excretory. The prohibitory treatment consists in regulating the method and manner of living to a degree most favorable to perfect physical development, together with the use of medicinal agents which tend to restore or stimulate the various functions of the body to perform their full duty. The excretory treatment comprises the use of medicinal agents which tend to eliminate the existing faulty conditions through the various secretions, but in the explanation of the phenomena producing the acidity, together with the setting forth of the means and methods of prevention of the same, there lies sufficient material for a somewhat extended paper, and we leave that for a future time.—*Items.*

NECROSIS. By James E. Power, D.M.D., Providence, R. I. Read before the Massachusetts Dental Society at Boston, June 1, 1904. The tissues of the body are capable of existing and performing their functions only for a certain length of time. Their power of renewal grows less as age advances, and finally their resisting powers are no longer capable of impeding rapidly-advancing degeneration. Then we have that suspension of function which is known as death. Life ceases with the gradual destruction of the functions of the different organs. Destruction of the functions of the heart, lungs, or nervous system causes death in a very short time. After destruction of the functions of the intestinal canal, of the liver, or kidneys, the organs are just as surely deprived of life, but some time may elapse before death takes place.

In contradistinction to this general death there is a local death of a part of single cells or group of cells. This is known as "necrosis."

In some forms of this local death the pathological changes take place so gradually that even microscopic investigation cannot detect them and decide just when the cells cease to live.

Tissues which exercise special functions will die more quickly than those which do not exercise such functions, as experiments have shown that by arresting the blood current the brain, renal, and intestinal epithelium will die in two hours, while skin, bone, and connective tissue will live twelve hours.

Characteristics of Necrosis.—Pathological conditions leading to necrosis may originate in the periosteum, developing such interference with the circulation as to cause death of the part by reason of the extension of the periosteum into the alveoli, forming the alveolodental membrane. Suppurative bacteria invade these cavities, causing looseness of the teeth, and if this inflammatory process be not arrested the plastic substances between the bones become rapidly converted into pus; then follow separation of the periosteum from the bone and destruction of the blood supply, when we get the condition known as necrosis.

The term necrosis when used in its proper sense refers to the process of death—the sum-total of the active causes which eventually bring about the death of a portion of the skeleton, osseous or cartilaginous. The degree of injury, idiopathic or traumatic, required to cause the death of bone is less than that required to disintegrate soft tissues. This is probably due to the anatomical construction of the parts. Necrosis is a condition, or rather the result of inflammatory conditions of bone.

The same conditions which exist in inflammation of the soft parts are present in bone inflammation, but here they terminate more quickly, because the tissues in the soft parts will undergo changes to accommodate the bloodvessels. This is not the case in bone, since the Haversian canals are completely filled with bloodvessels, and the cell structure is packed entirely around them, so that surplus space does not exist. When the blood is forced through these vessels, which are already taxed, they have not the power to accommodate themselves to this new and sudden demand. The bone tissues will not expand, and the result is that the vessels become choked. Then comes a condition of stasis, a retarded circulation, and finally the supply to the part is cut off and death ensues.

We know that the chief supply of blood is from the superficial lay-

ers of the bone, and when these are lifted away by accident the supply is again cut off and this same condition follows. The parts must be nourished, and any interference with this condition will cause necrosis if not arrested in time. The causes that may bring about this condition are very numerous, but the pathology remains always the same. The only variation is in the intensity and rapidity of the process.

Irritation is always present in necrosis. It may be mechanical irritation, as in the case of a fracture badly treated or an impacted or malposed third molar. It may be chemical irritation, which acts by virtue of its chemical reaction when applied to the tissues, such as arsenic, phosphorus, mercury, etc. It may be a septic irritant inducing the formation of poisons, or the introduction of such poisons themselves. I have seen and treated several cases of this class where local anesthetics and presumably unclean hypodermic syringes were used.

Necrosis is more frequent in the mandible than in the maxilla, probably due to the difference of bone structure. Also, the circulatory system is much more extensive in the maxilla than in the mandible. Bone is replaced by the process of repair in the mandible, while in the maxilla the space produced by necrosis is filled up with strong fibrous tissue.

As soon as the vitality of bone becomes extinct it becomes a foreign body, and in the natural order of things the system tries to expel it. The surrounding tissues, however, prevent this from taking place, and we get only a separation. This condition, if allowed to remain, will cause frictional irritation and will cause the inflammatory conditions to repeat themselves, when more necrotic bone is produced, unless surgical interference be resorted to.

Necrosed bone is generally separated from the living bone. This separated area is known as the sequestrum. It is held by the adjacent tissue, and while new bone generally forms beneath it, I have observed a case where the new bone formed entirely around the sequestrum.

Among the causes of this disease are recent injury, irritation from diseased teeth, badly-treated fractures, badly-treated teeth, malposed or malerupted teeth, tuberculosis, syphilis, excessive use of mercury, phosphorus and arsenic; fevers in children, and feebleness in old age. The principal kinds, however, which come under our observa-

tion are syphilitic, arsenical, and septic, the latter generally caused either by foreign bodies or unclean instruments.

Phosphor-necrosis.—Phosphor-necrosis was first observed about 1838, soon after the introduction of the manufacture of phosphorus matches, but of recent years we seldom find persons affected by it. This is due to the knowledge of the toxic action of the drug, and the precautions taken to ward against its evil effects. The part attacked is generally the mandible, but records show that the vomer, sphenoid, and basilar process of the occipital have been affected, and in the latter cases the result is generally fatal.

How the phosphorus acts is an obscure question, some claiming that it is the arsenic present that is the cause of the trouble, while Hirt, Mears, and Wagner have advanced plausible theories and observed facts which have helped to decrease the frequency of the malady.

This kind of necrosis manifests itself by pain and inflammation of the gum. If the tooth be extracted pus will follow, and each tooth will loosen and fall out until the disease comes to a standstill. A very foul-smelling pus flows constantly from the edges of the mucous membrane, and on close examination the odor of phosphorus will be detected. It is also distinguishable from other forms by the pain, which is at first intermittent, but finally becomes deeply seated and constant. Swelling is more marked, the soft tissues being infiltrated and puffy to a degree not noticeable in other forms of necrosis. Careful inquiry as to probable cause, study of the history, and examination of the cavity of the mouth will lead to a diagnosis.

In the treatment of this disease gargles, mouth-washes, tonics, and a general restoration of the physical condition of the individual are advised; fresh air, moderate exercise, etc. The surgical treatment in these cases should be delayed, as the slightest injury to the tissues of a person thus affected will cause serious complications.

Syphilitic Necrosis.—The same diagnostic signs that characterize other forms of necrosis may be present in syphilitic necrosis, and we are obliged to rely on the history as well as the physical condition of the patient. In consideration of these obligations we must insist upon the patient answering truthfully the questions we ask. My experience has taught me that a very large percentage of persons thus afflicted will deliberately misstate their case. Their ability to

inspire confidence by their apparent sincerity and solemnity of manner is as amazing as it may prove serious. This is probably due to their lack of moral courage to acknowledge their condition.

Syphilitic necrosis may appear at almost any age, probably more often after twenty-one years of age, although only a short time ago I was consultant in a case where a child nine months old had a well-developed case of syphilitic necrosis in the mandible extending along its whole border. Another interesting case which I had the good fortune to observe was that of a man about fifty years of age, who acquired syphilis, which caused a perforation of the hard palate about the size of a ten-cent piece; after removal of the bone the tissue closed over the opening, and examination a year later showed everything to be normal. I have seen several cases of syphilitic perforation of the hard palate, but this is the first case where I have seen the tissues close over and where the patient did not have to wear a plate.

This appears more often in the upper than in the lower jaw, although I have seen a case of syphilitic necrosis of the mandible extending from the symphysis to the angle. This patient was infected about twelve years ago, and instead of continuing treatment for three years he was discharged as cured after six months' treatment, everything being apparently normal until the second outbreak of the disease.

The treatment of this disease is first constitutional, second prophylactic, and third surgical.

Arsenical Necrosis.—This is caused by the chemical action of the drug when applied to living tissue, and is probably the one form which comes under the observation of the general practitioner of dentistry more often than any other, hence we should all know how to prevent its occurrence, to recognize its presence, and to treat the conditions when found.

The first symptoms of this form of necrosis are a dull, steady pain, not very severe but, as the patient will express it, annoying, and an inclination to grind the teeth. Examination will show a highly inflamed condition, very sensitive, and in the first stages a bright red line around the border of the inflamed area. As time elapses it assumes a grayish white color, and the tooth becomes sore; then it becomes very loose; the condition spreads from one tooth to another until the whole jaw is affected, and in cases of longer duration the patient becomes feverish and delirious and loses his appetite.

Arsenical necrosis is generally the result of the drug escaping from the cavity of a tooth when applied for devitalizing purposes, although I have one case where it was caused by the patient using colored yarn to remove particles of food from the interstices of the teeth. In this case it extended from one angle to the other.

I have treated a great many cases of this form of necrosis and most of them have been confined to a very limited area, although two were rather extensive.

The treatment of necrosis in general should be both constitutional and surgical. The first step is the removal of the cause, whether predisposing or exciting. In syphilitic and phosphor-necrosis constitutional treatment should be given before surgical treatment is resorted to. In all other forms it is my custom to operate immediately, and in a large number of cases I do not wait for the sequestrum to form, the conditions of the individual case, however, governing this. I also keep the bowels free by the use of cathartics, thereby eliminating any toxic elements which may develop in the alimentary tract. The free movement of the bowels will also draw the blood away from the inflamed part and give much relief to the patient. I advise keeping the patient in bed for at least twenty-four hours after operation, as rest is a very important consideration in assisting nature to restore the part to its normal condition.

Sinuses are generally present in neglected cases, and experience has taught me that such sinuses should not be exclusively used as guides. If so used they will prevent us from reaching the seat of the trouble, and if we do not do that we cannot effect a cure.

I have had some cases where the introduction of a probe into the sinus would not disclose the existing condition, so it is customary with me to extend such sinuses, or to cut deeply into the tissue and some distance from the apparent center of the trouble. In one case the trouble was at the socket of the third molar, the sinus was opposite the second bicuspid, and the probe when introduced would cause one to think that the focus was at the first molar, as at this point the probe would come in contact with the bone and could not be forced any farther We are taught that pus will flow in the line of least resistance, but I feel that this rule, while true, is somewhat misleading; to thoroughly interpret its meaning we should add that the line of least resistance will vary in every case, and sometimes in direct opposition to all rules of surgery or physics.

Operation for necrosis of the jaw should be carried out, when possible, from the inside of the mouth. In cases where external incision must be made give the patient the consideration justly demanded; make your incisions as you would have them made on your own face, and you will make them where they will be the least noticeable, cutting into existing lines in the face.—*Cosmos.*

MALIGNANT GROWTHS IN THE MOUTH. By R. H. M. Dawbarn, M. D., New York. Read before the New York Institute of Stomatology, June 3, 1904. The chief forms of malignancy directly of interest to stomatologists are the bony tumors of the jaws, malignant epulis, cancer or sarcoma of the tonsils or pharynx, cancer of the tongue and of the lip. In order to compress my paper within modest limits I shall refer only to such points in diagnosis as have a very practical bearing for you. As to tumors of the jaws, the case narrated by Dr. Howe demonstrates the ease with which a growth filling the antrum can be overlooked. I show you to-night the jaw and antrum tumor of this patient sent me by Dr. Howe about seven years ago upon a shrewd suspicion. It proved spindle-celled sarcoma, was excised, and remains cured. The use of a stout needle in this case, held in a firm holder, at once revealed decalcification of the bone. This you can verify for yourselves upon this specimen. The electric-light test also showed the antrum filled on that side.

Another case, sent me last December by Dr. W. C. Deane, presented nothing more than very trifling swelling of the bony roof of the mouth; but the needle test showed, where there should have been almost stony hardness, a softened area, about as firm as articular cartilage and shading gradually into the surrounding dense bone. This area was considerably larger than a silver dollar and irregular in outline. I operated upon her at the Polyclinic Hospital in December, 1903, removing by drill and rongeur the softened area, also about one centimetre of dense bone beyond, for safety, and of course the same extent of periosteum and mucous membrane. I could have then passed both thumbs into the nose through the gap so left. Professor Jeffries, pathologist at this school, pronounced the pieces of softened bone sent him typical carcinomata. At first, after healing, this lady wore a temporary

plate, for obvious reasons, but by continuous maintenance of unhealed edges, thus inviting growth by granulation, I have almost closed the gap, and it is now not larger than the head of a pin. She is courteous enough to be present to-night for your examination. So far as I can ascertain early decalcification, permitting successful use of the needle test, is the rule rather than the exception, but it has not heretofore been recognized that such is the case. I have proved it in a considerable number of instances now, but one each of sarcoma and carcinoma of the upper jaw suffice to-night to remind you of it.

As to cancer of the tongue, unquestionably neglect of decaying teeth, sharp-edged and persistently irritating the tongue against their lingual surface, constitutes the chief predisposing cause. The cancer begins almost always at the edge of the tongue, continually chafed by such a tooth, and here, as in epulis, or indeed any other soft growth, it is wise for the dentist to inject a few drops of say a one per cent solution of cocain, and then with curved scissors and forceps remove a small piece for the opinion of an expert in pathology. Then you will know what to expect, as to prognosis, after your surgeon has operated, and this report will also be his guide as to how extensive must be his excision.

Turning to treatment, we may put it rather concisely by saying that as yet there is no known means of a medical nature which is curative of malignancy, although arsenic pushed as far as is safe by hypodermic unquestionably slows and even checks the growth for a time of certain forms of sarcoma.

Prompt and wide excision remains our only safeguard, and by early diagnosis you have it in your power to save many lives through wise advice not to delay operation. But if the tumor be too extensive when first seen, or if it be so placed as to make excision anatomically hopeless, then our resources are either radium, X-rays, or Finsen light, naming them in order of speedy efficacy, or in just one instance, certain fusiform-celled sarcomata, the Coley antitoxin treatment, and finally my own plan of attempted starvation by depriving the tumor of its nourishment.

Regarding the use of radium and X-rays, doubtless Dr. Franklin will speak fully (DENTAL DIGEST, Dec., 1904, p. 1509), but it is the opinion of surgeons that where excision is possible it is unwise to delay. There have been some really brilliant cures by these

means, but on the other hand I have seen several cases go from bad to worse, and beyond hope of excision, during the delay of several weeks or longer with X-ray treatment. We cannot yet say why one case is helped and another is not. Apparently radium or X-rays are more hopeful in sarcoma than in carcinoma, but even in the latter I have noted a marvelous relief from the agonizing pain of cancer of the bodies of the vertebræ by placing a small radium tube of great power for an hour in contact with the back. Fully twenty-six hours of freedom from suffering followed, and this could not have been merely psychical, for the patients did not even know that anything unusual was to be tried.

Our wisest plan in cases still operable is to excise, and after the wound has healed to begin X-ray or radium treatment several times a week for a month or more, hoping in this way to prevent recurrence. Of late I have been following this plan regularly, and so do most other surgeons, I think, and not alone about the mouth, but after removal of the uterus or breast for cancer, or wherever it may chance to have been.

But if the tumor cannot be excised, and if the other two plans indicated have failed, what then? Are we at the end of our rope? In the region supplied by the external carotid we are not, and it means much to a patient to know this, and thereby to substitute for the certainty of death once more the uncertainty of life. When first I began experimenting in this unknown field, just nine years ago, I feared that attempted starvation of malignancy would result also in starving the nose, tongue, or other normal parts. Fortunately this was not the case, and we now know that normal flesh is able to survive with surprisingly little blood—much less than is necessary in order to permit so very vascular a thing as a cancer to continue growing. It was also demonstrated that no good would result from merely tying the external carotid on one or even on both sides. Nothing short of complete excision of both these arteries was effective—doing it for safety at two different periods of time.

At present the writer has excised the external carotids in nearly sixty instances, and the operation is surprisingly safe. If the patient is not badly cachetic, and if the surgeon is not so unwise as to attempt removal of the growth at the same sitting, there ought to be not over five per cent of mortality, and simple ligation of both

external carotids should have hardly any mortality at all. What are the results? In carcinoma, which spreads, as we all remember, not through the blood-vessels, but through its lymphatic channels, the results have been disappointing. Even here, however, we can expect with some confidence a considerable degree of shrinkage, but lasting only a few weeks or months—up to a year in one case, which otherwise would certainly have died within a month. But in sarcoma there is reason for a more cheerful view, and remembering that this malignant tumor spreads by its blood-vessels rather than its lymphatics, one could guess *a priori* that sarcoma would be better controlled by the starvation of blood than would carcinoma.

In Butlin "On Malignant Disease," round-celled subperiosteal sarcoma of the jaws is considered hopeless, whatever we do, and yet in my Gross prize-book are recorded two cases of this nature which have remained shrunken for much longer than the Volkmann period of three years, after which we may with some degree of certainty claim a permanent cure, and which still remain quiescent. The tumor did not of course disappear, but it became much smaller, harder and inactive. In several other instances of sarcoma there has been only a temporary checking, but this is generally longer than we have learned to expect in carcinoma. We must recollect that if a growth is so situated that it can get blood from the *internal* carotid or its branches—about the orbit, for example—the prognosis is necessarily bad. Of course we cannot tie off the internal carotid, too, for this would be useless unless done on both sides, and that would kill the patient promptly from anemia of the brain. (Roughly, the internal carotid may be said to supply brain and eye, the external carotid all parts of the upper neck, and of the head except as just stated.)

About a dozen members of the New York Surgical Society have tried my plan and sent me their results, all of which have been published. In every instance of recovery from the operation itself cancer—i. e., carcinoma—has been the form of malignancy, and, as it happens, in no case sarcoma as yet. This is unfortunate, and in fairness to this plan it is evident that it should be given a trial in sarcoma.

I trust it is plain to this society that this operation is not recommended by me for trial except as a last resource—after other

things fail, and since a coffin is the only alternative surely it is worthy of trial. In many instances patients are eager if only for a few weeks' longer life, perhaps for business reasons, to straighten out their affairs, and this at the very least we can give them. Again, in a case inoperable through size, and yet not extremely so, it is likely that we may be able, because of a few weeks' shrinkage, so to reduce the mass that it can safely be subjected to thorough work by the knife. I have within the past fortnight received from Professor J. Chalmers Da Costa of Philadelphia the account, sent me for publication, of a case of this very sort, refused as impossible of excision by two other prominent surgeons, but made easily operable by the starvation plan, so that after a few weeks' shrinkage Dr. Da Costa safely cut out the then shrunken tumor. These points, then, we can surely claim for this method of the *dernier ressort,* and, in addition, in sarcoma in some cases a real and permanent cure, in the sense that the shrunken mass has remained shrunken for years, and so far as I know permanently. The case sent the writer by Dr. Howe is such an instance, definitely cured, only there we could excise the tumor as well as the carotids.

In two cases in my book, of especial interest to you as involving the lower jaw, is one detail of the operation I must particularly mention and recommend. This is, upon completing the excision of the external carotid, to do a short, blunt dissection in the front of the wound high up, thus exposing the inner surface of the ramus and the inferior dental nerve and artery as they are about to enter the canal. The artery and also its mylohyoid or main branch, at this point easily seen, are tied. Thus we deprive the bone of a free anastomosis, for the inferior dental, coming from the internal maxillary, anastomoses freely through orbital branches with the ophthalmic from the internal or deep carotid. In cases of lower-jaw malignancy starvation, where this ligation is omitted, we can well see how the excision of the external carotid alone would prove almost valueless. This step does not add more than a few minutes to the length of the operation. Finally, in each of these cases an inch or more of the inferior dental nerve was excised, for in case the growth in the mandible should start up again at some future time we have at least made sure by this means that there will be little or no suffering. Of course it is essential that this be done upon both sides of the neck, just as with the work upon the arteries, otherwise little is gained.

In conclusion, we may claim the following advantages from the starvation plan in the external carotid area, in cases wisely selected. 1. In some instances of sarcoma it saves life by permanent shrinkage of a tumor too large to excise, or so placed that this is impossible. 2. In all instances surviving the carotid excisions there is a prolongation of life not otherwise possible of accomplishment; even in carcinoma this is true. This may in unfavorable cases be only a few months' gain, but patients are grateful even for this time in which the better to arrange their affairs. 3. Every operator has agreed that one striking effect is the lessening of pain, which is a prompt result of the anemia produced. 4. In some instances the shrinkage permits the removal of a tumor not possible of excision because of its size and vascularity at first.—*International.*

MANAGEMENT OF PYORRHEA ALVEOLARIS CASES. By Elgin Mawhinney, D.D.S., Chicago. Read before the McLean County Dental Society, October 10, 1904. The peridental membrane is subject to a great variety of diseases, many of which are little understood. Some of them have their origin in the membrane, others in the surrounding parts. These diseases are becoming very prevalent and at the present time more teeth are lost from them than all other causes combined. It is probably true that the present method of living is the important causative factor. Teeth and their associated parts were designed to chew coarse foods, and as our habits in this regard have changed and most of our foods are cooked the teeth have less work to do, and like all organs that are not used they deteriorate. Then, again, the excursion of coarse, tough foods over the teeth and gums tends to cleanse them of all accumulating mucus and debris and to develop the most resistant qualities in those organs.

In this paper I desire to present a method of managing the severer forms of the diseases of the peridental membrane and shall not stop to present the etiology of those diseases, for much has been written on this side of that subject lately and I have no doubt you are familiar with all the theories that have been advanced. The first step in any treatment is a proper diagnosis. Consideration must be given to the general systemic as well as the local conditions. So far as general conditions are concerned the important things to be considered relate to proper elimination; all

the nutritive functions of the body must be normally performed, and especially all the waste products of the body properly excreted. The next essential point in the treatment of these diseases is the thorough cleansing of the teeth, which in many instances is a very difficult thing to do. Not many severe cases will get well as a result of simply cleaning the teeth without further treatment, and none can ever be restored to health without perfect cleaning, no matter how much treatment it receives. I find after fifteen years' experience in handling these desperate cases which come into our hands after other dentists have given them up, that in 90 per cent failure has resulted because the teeth were not thoroughly cleaned, and in my own hands when failure results and teeth are lost I frequently find some place on the root that was not thoroughly cleaned.

The causes of failure to clean the affected roots, in order of their importance, may be grouped under five headings. First—Inaccessibility of the deposits. Second—Improper instruments. Third—Pain caused by instrumentation. Fourth—Lack of proper finger training. Fifth—Lack of concentrated effort.

Regarding the inaccessibility of the deposits, I might state that it is a matter of everyday observation that deposits of calculus or other foreign matter often occur at certain points on the roots of teeth where it is difficult to locate and remove them, for example, between the roots of the molars and on the apical third of roots where the gum and alveolar border remain intact, or where the points of discharge are on some surface of the root other than the surface upon which the calculus is located, as often occurs in incisors and cuspids where the points of discharge are at the gingivus on the mesial or distal, while the deposits may be on the apical third of the labial or lingual. The point of discharge in these latter cases is sometimes through a sinus opening on the gum nearly opposite the deposit, in which case this opening should be used as a place through which the scaling may be done, and in many similar cases it is best to make such an opening. In most of these severe cases the gum remains in nearly normal position, but the alveolar wall on the affected side of the root has been absorbed for a considerable width, extending below the deposits. Before attempting to scale such a pocket it is wise to make it as accessible as possible in order that the scaling may be successfully

done. For a number of years it has been my practice to first attempt to make such pockets accessible by packing a rope of cotton saturated in a 1 per cent solution of cocain hydrochlorate into them, forcing out the loose gum from the tooth root. If this pack is kept free from saliva and allowed to remain for five minutes the gum will be completely anesthetized and will stand away from the root a considerable distance, thus enabling the operator to see the deposits and remove them painlessly. In cases where this cotton pack does not accomplish the desired result it is my practice to pack with a small narrow triangular strip of aseptic gauze saturated in a 25 per cent solution of pheno-sulphonic acid and leave in place for twenty-four hours; this will crowd the gums away and partially soften the deposit, making its removal very easy, and if a cotton rope saturated with cocain be introduced, as previously stated, that operation will be painless. I do not wish to be understood as recommending this procedure for every case, for many can be successfully scaled without this step, although the cocain pack is desirable in every instance.

Regarding instruments with which to do the scaling, I wish to state that here is the cause of many failures. Most scalers are either too clumsy and improperly shaped, or else they are so flimsy that they spring over hard deposits. The Younger scalers are excellent, but it requires years of finger training to properly use them. For many years I have used a set of scalers which I designed and which meet the requirements more nearly than any other set. They are made by all the principal supply houses, and as I have no copyright or patent on them I feel at liberty to speak of them. They should be supplemented by two explorers. The points of excellence claimed for the set are: First—The working edge is in proper line with the shaft, so the instrument does not turn in your hand, and thus is under perfect finger control. Second—The shapes will easily reach every surface. Third—They work push or pull and are stiff, so they will not slip over hard deposits. Fourth—The backs of the instruments have no sharp corners, but are rounded and thus will pass under the gum with the least possible pain and tissue injury. Fifth—They are easily kept in order. Many of my dentist friends think their success in treating pyorrhea cases due to these instruments, and yet if one has become accustomed to other forms and can use them success-

fully I would not advise a change, for there is much in getting accustomed to handling instruments.

The pain caused in the operation of scaling comes from two sources, namely, the gum tissue and the dentinal fibrils that may be exposed about the necks of the teeth. I have already suggested my method of controlling the former, and with reference to the latter I would like to suggest two agents, namely, trichloracetic acid 10 per cent and chlorid of zinc used alone or with tincture of iodin. I apply whichever one of these works best for the given case around the dried tooth neck for a few minutes before operating, or in severe cases I may dismiss the patient for a couple of days and reapply before operating.

The operation of scaling a set of teeth badly affected with this disease is the most difficult of all dental operations, and to be successful requires a high degree of finger training both as to delicacy of touch and strength of grasp, as well as that education which enables one to know what he is touching and when the roots are perfectly clean. This can come only from months and years of practice, and even then success with any given case will come only after concentrated effort. Many do not succeed because they attempt too much at one sitting. The best plan is to take one tooth and concentrate every energy on it until thoroughly cleaned.

To try to keep in mind the peculiarities of deposits *on* as well as *of* root surfaces of several teeth at once will certainly result in failure. Concentration of thought and effort on one particular surface of the root is absolutely essential to success in removing every particle of that deposit. It is always my custom to begin with the lower right third molar unless there is some special reason for taking some other tooth. First explore its distal surface and learn the location of deposits and extent of pocket; next use the cocain pack; then the suitable form scaler, and attend strictly to that surface until perfectly clean.

I try to avoid withdrawing the scaler from the pocket more often than is absolutely necessary, but introduce it to the bottom of the pocket, and draw up and down and from side to side until most of the deposit is dislodged, only removing the scaler that the loose particles may be washed out. After I think the surface is cleaned I use the fine explorer again to make certain of it. I then

proceed to the lingual, then the buccal, and finally the mesial, confining my efforts to one surface at a time, and making certain of one tooth before proceeding to another.

If the affected tooth is loose in its socket it is important that it should be made stationary as soon as the cleaning is completed, and in very bad cases that should be done first. There have been many appliances suggested for this purpose, including cement, rubber and metal splints, gold and silver wire, gold bands and caps, with all of which you are familiar. For temporary purposes I have good success with silk ligatures. I use number "a" sewing silk, thoroughly waxed, and bind the loose tooth or teeth to solid neighbors.

Where the pockets are very deep, with a considerable formation of pus, I usually pack them with gauze saturated in 25 per cent phenol-sulphonic acid and leave for twenty-four hours, for the purpose of removing any bruised or necrotic tissue after the cleaning is done, and of course during cleaning the pockets are very frequently washed out with antiseptic solutions. On the second sitting I do not expect pus to be present; if it is I know I have not been thorough in my work and must repeat the scaling.

In nearly all cases the after-treatment consists of syringing out the pockets with antiseptic solutions and applying the glycerol of iodin and zinc (Talbot) to the pockets and gum freely every day for a week, then every second day for a week, then three times a week, twice a week, once a week, and once in two weeks, as the case progresses. I never dismiss a case under three months, and more frequently hold them for six months, and after they are dismissed it is understood that I am to see them every three months. The patient must take an interest in the case and carry out instructions to the letter. As an aid the patient must brush the teeth twice a day with a hard brush and alkaline tooth powder and rinse the mouth several times daily with an antiseptic astringent solution, and in addition the gums must be massaged every day, rubbing toward the crown of the tooth with the index finger moistened in the antiseptic solution. Unless the patient can be aroused to take an interest in the case you would better not attempt treatment, for failure will be the result. In those cases where the tooth has lost completely its alveolar socket I think it best not to attempt treatment, but extract

immediately and prevent the disease spreading to its neighbors, supplying the missing one by a suitable bridge. In these cases many have recommended extraction, deepening the socket, and replacing the tooth, but in my hands this brings very temporary benefit, for in nearly all cases such teeth are lost by absorption within two years.

Where the entire alveolar socket has not disappeared the tooth can often be retained for many years by attaching it to its neighbors permanently, either by bands or splints. Where the lower incisors are involved I usually devitalize the pulps and make a splint to fit the lingual surface of each tooth, with a pin into the canal. This is accomplished by slightly grinding the lingual surface around the point where the drill hole for enlarging the canal is usually made, then to each tooth burnish a piece of pure gold, gauge 36, to the ground surface and pass a pin into the canal, take a plaster impression of the lingual surfaces with gold and pins in place, from which a cast in investing compound is made and the whole united with solder, finished and set with cement. The same principle can be adapted to the upper front teeth and in many instances without devitalizing the pulps, although as a rule the cases we are now referring to will get well quicker if the pulps are removed. In not a few instances I have adapted the same plan to molars and bicuspids, but I think the Carmichael attachment well suited for these teeth. Whatever plan of fixation is adopted, it must be easily kept clean and hold the affected teeth firmly, otherwise it will be worse than nothing.

In upper molars it often occurs that the lingual root is badly affected while the two buccal roots remain fairly firm in their sockets. In such cases it is often wise to remove the pulp, fill the canals, and cut off the lingual root. I have many such cases doing good service for fifteen years and showing every evidence that they will so continue.

When I have thoroughly cleaned the affected roots and fixed them in proper position, and pus has ceased to form, I do not again tear open the pockets or in any way interfere with the forming granulations, nor do I inject hydrogen dioxid into them, for this might tear them open, but as stated above, rely on sponging the gum margins and flooding with antiseptic solution by means of the water syringe or compressed air atomizer, carefully used. I am

certain many failures result because operators are constantly tearing open pockets.

The essential points of the paper may be stated as follows: First—Teeth affected with pyorrhea alveolaris must be thoroughly cleaned and polished even if no calculus be present. Second—Loose teeth must be fixed. Third—When pus ceases pockets should not be reopened, but protected and encouraged to completely close. Fourth—The proper massaging of the gums. Fifth—The valuable medicinal agents are pheno-sulphonic acid, to soften the deposits and remove necrotic tissue. Trichloracetic acid to relieve sensitiveness of exposed fibrils and burn away fungus tissues. Chlorid of zinc for the same purpose. A combination of chlorid of zinc one part and tincture of iodin two parts, to obtund the sensitive necks of teeth as well as for its alterative effect upon the gums. Glycerol of iodin and zinc, which is made of five parts iodin crystals, seven parts iodid zinc crystals, and sufficient glycerin to make a thin cream, used for its alterative and astringent effect upon the gum tissue. As a mouth wash, the following will give an idea of what is needed:

Sodii Boras.....℥ij
Acidi Carbol.....℥i
Thymolis .....grs. x
Glyc. Tannin.....℥i
Ol. Cassiæ.....m-xx
Ol. Wintergreen.....m-x
Alcoholis .....℥ij
Aquæ dist. qs. ad.....℥vj

M. Filt. Sig. Use a teaspoonful in one-fourth glass warm water as a mouth wash several times daily. Sixth—As a systemic aid the use of natural fruit juices, drinking eight glasses of wholesome water daily, eating sparingly of meat, outdoor exercise and keeping the bowels open are all important. Seventh—The patient must understand something of the nature of the trouble and must take an interest in the treatment. When the above conditions are carried out to the letter success is assured in 90 per cent of cases.

I bespeak your interest in this subject and ask you to try these suggestions thoroughly, and beg you in the name of our profession and suffering mankind to recognize these cases early and not to dismiss them lightly with the statement that they are incurable, a

statement which has been made so often by so many dentists that at the present time the laity believe it to be true and despairingly submit to the inevitable, and thousands upon thousands of teeth are needlessly lost.—*Northwestern.*

APICAL PERICEMENTITIS AND ITS RESULTS. By M. L. Hanaford, D.D.S., Rockford, Ill. Read before the Northern Illinois Dental Society, October, 1904. Let us refresh our memories with a brief study of that dental malady which can be the cause of the most excruciating agony, and probably occasions the loss of more teeth than all other causes. I shall make liberal use of the work of Black, Garretson, Gilmer and others, and may not always mention the quotation marks.

Classification. Some six or seven forms of diseases of the peridental membrane are recognized, but for my present purpose two only will be considered, apical pericementitis and alveolar abscess. *Apical pericementitis*—as its name implies—is an inflammation of the peridental membrane, having its beginning in the apical space, due almost always to death and decomposition of the pulp, and tending strongly to the formation of pus. If it is ever found associated with a living pulp it is due to an extension of inflammation from a pulp hopelessly congested. Apical pericementitis usually follows the death of the pulp in two or three days, being, however, sometimes delayed for weeks, and occasionally, though very rarely, is absent altogether during life.

Diagnosis. The peridental membrane, from its anatomical environment, is incapable of even a slight inflammation without becoming painful. The tooth is tender to touch and raised from its socket, making its diagnosis usually easy. Sometimes, however, the adjoining teeth partake of the symptoms to such a degree that a correct differentiation becomes a matter of some difficulty. Any one of several teeth seems about equally tender to percussion. In such a case the successive tapping of several teeth in rotation, noting carefully any difference in the response from the patient, and also any slight difference in sound (the affected tooth giving a duller sound), will materially aid in reaching a decision. If there be sensitiveness to thermal changes it is probably a case of pulpitis, the exception being in case the pulp canal is filled with gaseous products of decomposition, when extreme sensitiveness to heat

occurs from expansion of those gases, thereby causing pressure upon the peridental membrane by way of the apical foramen. *Chronic Pericementitis* differs from the acute form in exhibiting less violent symptoms of the same general character, and absence of the tendency to the formation of pus.

Treatment. The first procedure in the treatment naturally will be the removal of the cause, which is accomplished by opening the pulp chamber, thereby liberating the pent-up gases. Whether we will go further and attempt to remove the pulp may be a question worthy of careful consideration. Black says the pulp should be removed at once with barbed broaches, and undoubtedly such a procedure is perfectly logical in theory. In practice, however, it has been my experience that only in rare cases is it necessary or desirable to do so. A free opening, under rubber dam if practicable, with a careful application of peroxid of hydrogen several times repeated, followed with an antiseptic dressing, lightly applied and unsealed, rarely fail to give grateful relief. Several reasons for this treatment, as opposed to the attempt at thorough removal of the pulp and sealing of the canal, may be mentioned and seem to me sufficient. The tooth is exceedingly sensitive to pressure and the patient nervous and intolerant of anything that "hurts," so if one can relieve the tension easily and quickly he has gained a point. If a drill must be used, that of itself is enough to require a patient to endure. The pulp, whether congested or partially decomposed, is likely to be sensitive to broaching at the first treatment, whereas after the subsidence of inflammation the broach may be used with impunity. It will be noted that I prescribed the use of the rubber dam if practicable. This I would not always insist on, but where it can be applied with little or no pain, and especially if the case is that of a lower molar, the advantage of having the parts free from saliva and blood, of being able to see well, and to apply an essential oil uncontaminated by the fluids of the mouth, fully offsets the matter of time and inconvenience of its application. If the canal be bathed a number of times with peroxid, then dried, and the oily dressing be applied on cotton sufficient in size to fill the cavity, the gases of decomposition will escape, while the saliva will not penetrate for a considerable time. This treatment should be supplemented *as soon as possible after the subsidence of inflammatory symptoms* by a thorough cleansing of the pulp chamber

under antiseptic conditions, the introduction of a mild antiseptic dressing like eucalyptol, Black's "1, 2, 3," or oil of cajeput, and the sealing of the same in place. If the formation of gases is still feared the seal may be punctured with a small instrument, although if the treatment has been thorough it will rarely be advisable. If pain recurs the patient should return and the necessary venting be done by the dentist himself under conditions as nearly antiseptic as possible. The practice of leaving roots of teeth open to infection from the mouth on account of loose stoppings, or the removal of stoppings for any reason by patients themselves, in my judgment cannot be too strongly condemned. Continued reinfection, thus prolonging the treatment unnecessarily, if not precluding the ultimate salvation of the tooth, is certain to follow, to say nothing of the great danger of discoloration. In addition to the above, local counterirritation is to be recommended in the form of capsicum plasters, cups, or the topical application of that old and time-tried prescription of Garretson's, namely, tincture of iodin two parts, tincture of aconite one part. A hot foot-bath is useful in deflecting the blood from the affected part, or a saline cathartic may be employed to reduce temporarily the blood tension. If indicated, some one of the coal-tar anodynes should be prescribed, as antikamnia, ammonol, phenacetin, etc. If in spite of treatment resolution does not take place and marked improvement be shown within, say, three days, it is almost a certainty that pus will form, in which case we have an acute alveolar abscess.

Alveolar Abscess. The formation of pus in the apical space causes increased pressure and greatly aggravates the pain. The fibers of the peridental membrane are stretched and distended by the pus, thus pressing upon the bony walls of the apical space, causing absorption and a considerable enlargement in the line of least resistance before the external plate of bone is penetrated. The peridental membrane, although enormously swollen, rarely becomes detached from the root end except in chronic cases, but when from any cause, as absorption of the root, such detachment does occur, the prognosis is much less favorable. In that case the roughened root in its turn becomes an irritant, or there may take place a deposit of calcareous matter at that point.

Until the pus has burrowed through the bone and reached the soft parts there is no cessation of pain, but as soon as this occurs

the pain diminishes and the face begins to swell and continues until there may be great distortion of the features. At this stage a more or less softened lump appears over the affected root. Evacuation of the pus by lancing is followed by immediate relief, the swelling subsides, and if left to itself the case passes into a chronic state, which is characterized by a slight though constant discharge of pus and no other inconvenience.

Pathologists describe three ways in which the escape of pus in an acute abscess may take place. In the first form it occurs as outlined above, namely, directly through the external plate into the soft parts. In the second form the periosteum is lifted from the bone, owing perhaps to the severity of the inflammation by which its attachment is weakened. In this case, if the pus remains long in contact with the denuded bone there follows necrosis or death of a considerable area of it. In the third form the pus follows the peridental membrane down the side of the root and discharges at the margin of the gum, thus being easily mistaken for a pyorrheal discharge.

The phenomena of the burrowing of pus in alveolar abscess are interesting and worthy of study. As a general rule when an abscess passes into the chronic form the discharge of pus continues at the original point of exit, but occasionally that orifice becomes closed and the burrowing takes most erratic courses. Gravitation sometimes plays an important part, especially in the lower jaw, in which case instances are recorded where the discharge has taken place as low down as the clavicle. In the upper jaw the pus often burrows into the nasal cavity, the antrum, follows beneath the mucous membrane to the junction of the hard and soft palates, or is discharged on the face.

Blind abscesses are those which have no external opening, the pus being either discharged through the tooth, or being of so small quantity that that which is not tolerated by a gradual increase in size of the apical space is probably absorbed.

Treatment. The first procedure in these cases is of course to evacuate the pus. If no external indication of pus is present the tooth should be opened and the abscess allowed to drain through it. If the external plate of bone has been penetrated a bistoury should be used. After the subsidence of the acute symptoms, say in a day or two, the pulp canals should receive careful antiseptic treatment,

when, if the case is a simple one, entire recovery will shortly follow. The treatment of chronic abscess varies with reference to the particular form of the disease. In simple cases the treatment outlined above will usually suffice. When, however, there is considerable injury or destruction of the tissues in the apical space, or there is accumulation of serumal calculus or necrosis, more heroic measures are indicated. The entire tract of the abscess must be cleansed and disinfected. For this peroxid of hydrogen, by syringe or pumping through the root, will be adequate for cleansing, and a stimulant antiseptic, like Black's "1, 2, 3," will probably do the rest.

If the end of the root is denuded and roughened, or there is calculus, as can be ascertained by probing, the case will never recover until this condition is corrected. By applying cocain locally the parts may be anesthetized so that the root may be reached with a spoon excavator and smoothed, or amputation of the root end easily accomplished. In the latter case Dr. Gilmer directs that a hole should first be drilled through the root, into which a fissure bur should then be introduced and made to cut in either direction laterally until the root end is severed. I have performed this operation a number of times, finding it comparatively easy and effective. In case of destruction of the external plate of bone by necrosis, the necrotic tissue must be removed and the parts treated on general principles.

Abscesses occasionally develop in cases of filled roots, owing to imperfect closure of the foramen or the neglect of antiseptic precautions at some stage of the operation. If such tooth contains a good filling or there is a good crown in place, the temptation is strong to attempt treatment by injecting remedies by way of the fistula, but nine times in ten, perhaps ninety-nine in a hundred, such attempts will result in only temporary improvement, if indeed so much. The roots must be reopened and treated as from the beginning before a permanent cure can be effected. Not infrequently two roots of adjoining teeth may be the seat of abscesses which have a common outlet. Failure to cure a case in a reasonable time by the ordinary means should suggest the possibility of another tooth being involved, and careful search should be made for it. All treatments for abscess should be thorough and not too often repeated. In this respect great progress has been made in twenty-five years, and doubtless the next two decades will bring many surprises. We are going to rely more upon nature and less upon drugs, and one great point which we must remember is that nature sometimes needs to be let alone.—*Review.*

MUCIN AS A FACTOR IN DENTAL CARIES. By Dr. Aug. Lohmann of Cassel, and Dr. E. C. Kirk of Philadelphia. "The author believes that mucin has a decalcifying action upon the enamel of the teeth. He has observed that people whose salivary secretion is abundant, with mucin in large proportion, have a considerable number of carious teeth, and that the carious process is more rapid when the saliva is decidedly viscid. He has carried on a series of investigations and found that mucin has as strong a decalcifying action as lactic acid. A molar weighing 2.131 gm. suspended in the mucin obtained from the saliva of a girl aged eighteen weighed only 2.112 gm. at the end of the thirtieth day. The saliva of pregnant women contains a great proportion of mucin and is therefore more decalcifying than that of the normal subject. A tooth weighing 2.066 gm. suspended in the saliva of a pregnant woman weighed only 1.777 gm. after thirty days' sojourn in the fluid. An experiment was made with lactic acid in 2 per cent solution. A tooth weighing 2.117 gm. was allowed to remain in this solution for thirty days. At the conclusion of the experiment it weighed 2.072 gm. It should be remembered that lactic acid is present in the salivary fluid to the extent of 0.75 per cent. The effects of the presence of mucin upon the surfaces of teeth and mucous membrane can be neutralized by the action of slightly astringent and antiseptic solutions, or by means of a physiological salt solution, which is a solvent for mucin."

The paper of which the above is a resume is published in full in *Archiv fur Zahnheilkunde* for June, 1904. The claim is novel, not to say startling, in view of the fact that we have come to be pretty well assured that the problem of the etiology of dental caries has been practically settled through the researches of Miller and those who have confirmed his observations by further work. Indeed, so revolutionary does the claim of Lohmann at first reading appear that one's feeling regarding it is well expressed in the words of Prof. Miller, as follows: "The view recently promulgated by Lohmann that caries of the teeth *is due solely to the action* of the mucin of the saliva stands at variance with some of the simplest facts of dental pathology and bacteriology to such an extent that it hardly seems indicated to enter into a discussion of it here."

In view of the sweeping character of Lohmann's claim the criticism of Miller above quoted does not seem to us to be unwar-

ranted, yet a careful reading of Lohmann's paper leads us to feel that in spite of his sweeping generalization he has raised certain questions regarding the relation of mucin to the causation of dental caries which cannot be so summarily dismissed, and which are entitled to thoughtful consideration. We think it has been demonstrated to a finality that dental caries is conditioned upon bacterial activity, and that the dissolution of tooth structure is in the first place brought about by acids, which agents alone have the power to dissolve the calcium phosphate of tooth structure. It has also been demonstrated that the bacteria concerned in the production of dental caries generate lactic acid as a result of their fermentative action upon carbohydrates, and that the lactic acid so produced dissolves the calcium phosphate of the tooth. It has not, however, been shown that mucin may not be a factor in the process. Lohmann's claim that mucin is capable of directly producing caries, if such be his position, cannot be taken seriously in view of what is already known of the carious process.

The data regarding the properties and composition of mucin to which Lohmann directs attention are, however, of such a character as to be worthy of investigation. The fact that mucin is in itself acid in character would indicate that it has a solvent action *per se* upon tooth structure. This fact seems to have been verified by Lohmann's experiment, in which he shows comparatively the solvent action of mucin and lactic acid respectively upon teeth. But granted that mucin will dissolve tooth structure, it must be borne in mind that simple tooth solution is not tooth caries, nor can anything even simulating caries be produced in a tooth by the direct application of acid solvents. Chemical erosion might be so produced, but caries is not erosion and has nothing in common with it so far as its microscopical appearances are concerned. Two facts in connection with Lohmann's contention seem to us to be of importance: First, that caries is more prevalent in mouths characterized by a viscid, stringy saliva; this we think will fully accord with the results of clinical observation, and the viscidity of the saliva we believe is rightly attributable to its abnormal content of mucin. Second, the fact that there is a 25 per cent carbohydrate moiety in the chemical composition of mucin, and it would seem not improbable that this carbohydrate feature of mucin might possibly form a fermentable pabulum for the action of the lactic-acid

group of bacteria through the activities of which tooth caries might result.

In addition to the points adduced by Lohmann in favor of his mucin theory, it is noteworthy that the saliva of arthritic individuals, who are generally immune from dental caries, is also lacking in mucin—indeed, in many it is almost totally absent as a constituent of the saliva. The question raised by Lohmann is an interesting one. Some of his deductions do not seem to be warranted by the evidence presented and especially in view of what is already known of the causation of dental caries, but there is much about this important question that is still unsolved, especially regarding the fact of the immunity from this disease which is enjoyed by many individuals. And we are more and more impressed with the belief that the chemical composition of the saliva is the key to the situation. Hygiene of the mouth is not sufficient to explain immunity, nor does an unclean mouth explain susceptibility to caries. Clinical observations refute both possibilities. Something in or something lacking in the composition of the saliva which determines its suitability as a pabulum for the development of caries-producing fungi seems to us to be a guess much nearer to the truth, especially as the variability in composition of the saliva in different diathetic states is in fairly close relation to immunity and susceptibility to caries in various individuals. We know little of the meaning and function of mucin as a constituent of the saliva. It offers an interesting field for study. We should know all that it is possible to know about the composition of the oral fluids, and as a matter of fact we must possess this knowledge before we can settle the question not only of caries but of many other oral conditions. Therefore we feel indebted to Dr. Lohmann for directing attention to this matter, which, if not as important in its bearings as he is inclined to regard it, is at least of sufficient importance to be worthy of careful and systematic study.—Editorial in *Cosmos*.

CONTOURING AMALGAM FILLINGS WITH BUT LITTLE SPACE. By Otto E. Inglis, D.D.S., Philadelphia. It often occurs that there is difficulty experienced in separating teeth for filling when one of the teeth is largely broken down upon one proximal surface, because of the great difficulty of so placing the wedge that it may have a point of support and thus act as such.

Sometimes also only slight space may have been gained for other reasons. Even when such space has been obtained the use of the matrix, reasonably bulky at best, takes up some of the room required for contour in such a way that when finally finished a plastic filling may have a contour not more than reaching the approximating tooth when the two teeth have returned to their normal places in their alveoli.

In these occasional places the writer has used with satisfaction to himself what may be termed a half matrix. The chief function of a matrix is to so confine the plastic filling material that it shall be held within four walls, and that pressure exerted upon it with the packing instrument shall force it into adaptation with the cervical margin without the plastic overrunning that margin to any marked extent. The filling is thus condensed as much as possible and the surplus to be finished off reduced to a minimum. With amalgam the condensation is of the greatest importance, so that the amount of mercury in the filling shall not be in excess, in view of prevention of future flow. The half matrix meets this indication at the cervical half or even two-thirds of the filling, while at the same time it permits the amalgam to be packed directly against the contour point of the adjoining tooth.

Suppose a right lower first molar, distal surface, requires a contour filling. The second molar has a sound contour surface or the contour has been previously restored with amalgam. In the preparation the margins are extended so that the lingual and buccal margins are at or nearly at the lingual and buccal embrasures, well distant from the approximating tooth. The cervical margin should be cut well toward the gum and better beneath it, which in most teeth removes that margin from approximation with the second molar. The rubber dam being in place, a Clapp matrix made of thin copper, of a width to extend from beyond the cervical margin almost to the contact point of the second molar, and of a length sufficient to lap over on the buccal and lingual sides, is to have its upper edge beveled outwardly to a knife edge. It is then threaded with the floss silk and secured in place as usual with the Clapp matrix by two turns about the cervix of the tooth, after which a knot is tied. With a ball burnisher the upper part of the matrix is pressed back against the second molar where the knife edge reaches a point just below the contact point. Amalgam is now

pressed into the cavity and against the matrix and well packed down with large flat instruments or balls of spunk held in strong pliers. As the top of the matrix is reached the fingers of the free hand are used to enclose the upper part of the cavity as a matrix and the packing is continued against all parts, including the second molar. The matrix will be pressed somewhat away from the first molar by this procedure, but this is a matter of but little moment, as the point is eventually reached beyond which the amalgam does not move. The filling is now allowed to crystallize to that point at which it will break away like partially-hardened plaster with a more or less clean fracture. It is necessary to wait for this condition in order that the filling be not moved from the margins during the finishing process and the removal of the matrix.

An old pair of Rhein's proximal trimmers and a large Butler spoon excavator are used to shape the occlusal portions of the filling. The ligature is then cut and removed, after which the copper matrix is straightened and carefully removed sidewise. The edges of the trimmers are now useful for spading away any excess at the buccal and lingual margins, after which they are used to shape the amalgam at the level of the contact point to a nicely-rounded contour which shall leave a graceful and useful embrasure leading to the contact point. At this point the amalgam is permitted to lie undisturbed in contact with the second molar. A oo sickle-shaped Lord scaler will be useful in removing any flaring portion of amalgam that may remain at the sides of this contact, but should never be passed between the filling and the tooth. The cervical excess, if any, should now be gently filed away with the serrated side of the trimmer. The rubber dam may be removed by cutting the septum.

When polishing at a later sitting little attention need be paid to the contact point beyond obtaining assurance that no sharp edges remain there, and a slight pumice and chalk polish. To polish the proximal surface a narrow strip may be threaded through after first cutting one end diagonally to a point. The other portions of the filling are then to be polished as with gold. By this means with almost no space a secure and almost ideal contact may be secured.—*Stomatologist.*

The Dental Digest.

PUBLISHED THE LAST WEEK OF EVERY MONTH

At 2231 Prairie Avenue, Chicago,

Where All Communications Should be Addressed.

Editorial.

THE TEETH AS A MEANS OF IDENTIFICATION.

Our readers will perhaps remember that we discussed this subject editorially some months ago. The reason for again calling attention to it is because a striking illustration of the value of the teeth as a means of identification has recently been given. We reproduce herewith a circular sent out by the chief of police of Colorado Springs, which gives a description of the nude body of a murdered woman which was found on Cutler Mountain near Colorado Springs, December 17, 1904, also a chart giving in detail the condition of the woman's teeth.

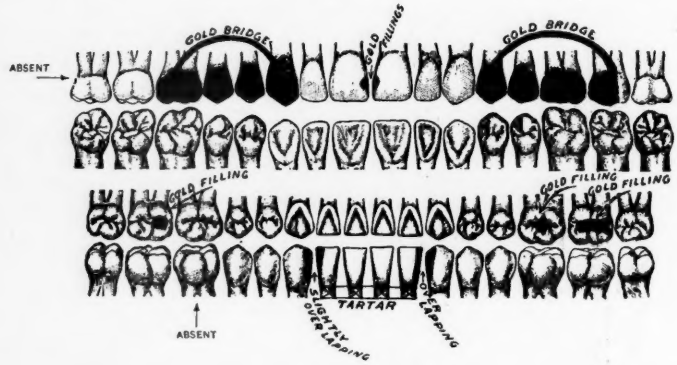
The body was that of a woman well developed and apparently well kept, but discolored from fire and exposure to the elements. The face, nose, lips, chin, left side of neck, both ears, shoulders, and breasts burned so as not to be recognizable.

She was probably between 25 and 35 years of age, weight about 120 to 130 pounds, height 5 feet 2 or 3 inches, light auburn or ash blonde hair, part of which was burned off: skin evidently fair, with no birth marks or scars showing; small bones, limbs well rounded, hips and thighs large, very small hands, nails clean, long, and well manicured; feet small, toes even and straight, nails manicured; probably wore a number 2, 2½ or 3 shoe.

Teeth.—The teeth were large, white and chalky. In the upper jaw on the right side the third molar had never developed; the second molar was present with no fillings. A bridge extended from the first molar to the cuspid. This bridge was of solid gold and worn on the linguo-mesial portion of the crown. The first and second bicuspid being absent, their places were supplied with solid dummies. Two gold fillings of medium size were in the mesial of the upper central incisors. The upper teeth protruded slightly. In the upper jaw a gold bridge extended from the left first bicuspid to the second molar; a peculiarity of this bridge is in the fact that the second molar was made of a bicuspid dummy. The third molar on this side was present. In the lower jaw on the right side the third molar

tooth was present, the second molar had a gold filling in the mesio-occlusal surface. The first molar was absent, evidently for some years, as the space is almost closed. Slight overlapping of cuspid on lateral. Pyorrhea of lower teeth—centrals and laterals—with considerable tartar, showing that they had not been cleaned recently. Left side: Considerable overlapping of cuspid on lateral; all teeth present on left side of lower jaw. First molar, large gold filling on occlusal surface; second molar, large gold filling on the occlusal extending on to the distal surface; third molar undeveloped—that is, partially covered with tissue.

All clothing, finger and ear rings, and all other means of identification had been removed from the body and no trace of same have been found; and



up to the present time we have been unable to identify her. The above description and diagram are the only evidence we have for identification.

Kindly call the attention of dentists in your city to the above description and diagram. If possible have your newspapers print it.

Address all information and inquiries to

W. S. Reynolds, *Chief of Police.*
Colorado Springs, Col., Dec. 28, 1904.

We have cited other instances where the only hope of identification lay in the teeth, and it will be noticed in this case that the only trustworthy evidence can come from those organs. If this chart and description are seen by the dentist who served this unfortunate it will not only strengthen the claim that the teeth are the only imperishable physical data, but will add emphasis to the argument which has been made in these columns that dental data should be employed in identification by life insurance companies and should be made use of by those authorities who handle soldiers and criminals. Some practitioners have argued that casts

are valuable in this scheme of classification, and we know of a few instances where they have taken impressions of their own mouths as well as those of relatives and friends. It is not sufficient for the dental practitioner to record on his chart merely those operations which he has performed. As each new patient presents a complete record of the condition of the mouth should be set forth, showing the work already done as well as that needed. Aside from the value which such a record might have in case legal complications ever arose, the dentist owes it to the patient, to the profession and to himself to make such. As a rule physicians are far ahead of dentists in this matter, and new theories in medicine are usually accompanied by illustrations from a number of cases in the physician's own practice. While true to a limited extent, this is by no means so universally the case in dentistry, and it must be admitted that the average dental paper or dental society discussion smacks too much of hearsay and guesswork and lacks that convincing proof which comes from a careful observation of actual cases. This lack can be supplied to a great extent by recording accurately and systematically all dental operations.

Notices.

VERMILION COUNTY (ILL.) DENTAL SOCIETY.

The Vermilion County (Ill.) Dental Society was organized at Danville, Jan. 10, 1905, and elected the following officers: President, J. B. Rideout, Danville; Vice-president, G. M. Hanly, Hoopeston; Secretary, J. W. Minnis; Treasurer, G. O. McLean, Urbana.

TRI-CITY DENTAL SOCIETY.

The Tri-City Dental Society held its annual meeting at Omaha, Jan 7, 1905, and elected the following officers: President, G. W. Hamilton, Council Bluffs; Vice-president, W. A. Cox, South Omaha; Secretary, E. H. Bruening, Omaha; Treasurer, J. H. Wallace, Omaha.

JO DAVIESS COUNTY (ILL.) DENTAL SOCIETY.

The annual meeting of the Jo Daviess County (Ill.) Dental Society was held at Dubuque, Ia., Jan. 24, 1905, and the following officers were elected: President, F. Stryker, Galena; Vice-president, H. C. Puckett, Warren; Secretary and Treasurer, J. J. Cresswell, Galena. The next meeting will be held at Scales Mound.

TACOMA (WASH.) DENTAL CLUB.

The Tacoma (Wash.) Dental Club was organized Jan. 9, 1905, and the following officers were elected: President, J. W. Cloes; Secretary and Treasurer, B. E. Lemley.

NOTICE.

The publisher desires to state that all subscribers will be continued on the mailing lists as heretofore at the regular subscription price of one dollar per annum until notification to the contrary is given.

VERMONT STATE DENTAL SOCIETY.

The twenty-ninth annual meeting of the Vermont State Dental Society will be held at Hotel Berwick, Rutland, March 15-17, 1905.

THOS. MOUND, Secy., Rutland.

MASSACHUSETTS BOARD OF REGISTRATION IN DENTISTRY.

A meeting of the Massachusetts Board of Registration in Dentistry for the examination of candidates will be held in Boston, March 8-10, 1905. Application blanks may be obtained from the Secretary.

G. E. MITCHELL, Secy., Haverhill.

SOUTHWESTERN MICHIGAN DENTAL SOCIETY.

The Southwestern Michigan Dental Society will hold its annual meeting at Kalamazoo, April 11-12, 1905. Some very interesting papers and clinics are promised, and the profession is invited to meet with us.

C. W. JOHNSON, Secy., Lawton.

SEVENTH DISTRICT DENTAL SOCIETY.

The Seventh District Dental Society will hold its annual meeting at Rochester, N. Y., March 28-29, 1905. An interesting and profitable meeting is expected and the profession is cordially invited to be present.

I. C. EDINGTON, Chairman Bus. Com., Rochester.

SEATTLE (WASH.) DENTAL CLUB.

The Seattle (Wash.) Dental Club held its annual meeting Jan. 9, 1905, and elected the following officers: President, E. S. Barnes; Vice-president, F. W. Hergert; Secretary, H. V. Luithlen; Treasurer, C. B. Reynolds.

McDONOUGH-FULTON COUNTY (ILL.) DENTAL SOCIETY.

The McDonough-Fulton County (Ill.) Dental Society was organized at Bushnell, Jan. 5, 1905, and the following officers were elected: President, G. L. McMillan, Macomb; Vice-president, F. A. Lane, Macomb; Secretary, C. B. Warner, Avon; Treasurer, C. F. Birney, Table Grove; Librarian, C. L. Cleveland, Bushnell.

GOLDEN ANNIVERSARY BANQUET TO DR. GEO. J. FRIEDRICHS.

A Golden Anniversary Banquet will be tendered on Feb. 21, 1905, by the dentists of New Orleans to Dr. George J. Friedrichs, who graduated in dentistry Feb. 21, 1855. L. D. ARCHINARD, for Com. of Arrangements.

WILL-GRUNDY COUNTY (ILL.) DENTAL SOCIETY.

The Will-Grundy County (Ill.) Dental Society was organized at Joliet, Jan. 24, 1905, and the following officers were elected: President, S. F. Duncan; Vice-president, A. F. Cheeseman; Secretary, G. M. Brunson; Treasurer, J. B. Foster.

KENTUCKY STATE DENTAL ASSOCIATION.

The next annual meeting of the Kentucky State Dental Association will convene at Lexington, May 15-16, 1905. We anticipate a pleasant as well as a profitable meeting, and a most cordial invitation is extended to the profession to be with us. W. M. RANDALL, Secy., Louisville.

LYNN (MASS.) DENTAL ASSOCIATION.

The annual meeting of the Lynn (Mass.) Dental Association was held Dec. 21, 1904, and the following officers were elected: President, John Kennedy; Vice-president, P. B. Lasky, Marblehead; Secretary, B. W. Percival; Treasurer, E. W. Marvin; Executive Committee, A. B. Mudge, R. H. Bath, J. D. Hogan.

SOUTHERN IOWA DENTAL ASSOCIATION.

The Southern Iowa Dental Association held its annual meeting at Burlington, Jan. 10, 1905, and elected the following officers: President, A. W. Dana, Burlington; Vice-president, J. B. Monfort, Fairfield; Secretary, G. W. Slingluff, Burlington; Treasurer, J. T. Martin, Muscatine. The next meeting will be held at Keokuk.

READING (PA.) DENTAL SOCIETY.

The seventh annual meeting of the Reading (Pa.) Dental Society was held Jan. 5, 1905, and the following officers were elected: president, Chas. E. Grim; Vice-president, C. R. Scholl; Secretary, George S. Schlegel; Treasurer, J. T. Bair; Executive Committee, W. H. Scholl, Otto J. Specker, E. W. Bohn.

GEORGE S. SCHLEGEL, Secy.

LUZERNE AND LACKAWANNA DENTAL SOCIETY.

The Luzerne and Lackawanna Dental Society held its annual meeting at Wilkesbarre, Pa., Dec. 20, 1904, and the following officers were elected: President, R. S. Meixell, Wilkesbarre; Vice-president, W. E. Spencer, Carbondale; Secretary, E. J. Donegan, Scranton; Treasurer, George C. Knox, Scranton; Board of Directors, C. S. Beck, Wilkesbarre; C. C. Laubach, Scranton; W. J. Becker, Carbondale; H. H. Myers, Plymouth; F. L. Mills, Nanticoke.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The annual meeting of the National Association of Dental Examiners will be held at Buffalo, commencing 10 a. m., July 24, 1905, and continuing until adjournment. The hotel and assembly rooms for holding sessions will be announced later. Arrangements for members in the east have already been made with the Lackawanna Railroad for reduced excursion rates.

CHAS. A. MEEKER, Secy., Newark, N. J.

LEHIGH VALLEY DENTAL SOCIETY.

The Lehigh Valley Dental Society held its annual meeting at Easton, Pa., Jan. 16, 1905, and elected the following officers: President, O. H. Uhler, Allentown; Vice-president, W. C. Middaugh, Easton; Treasurer, J. C. Hertz, Easton; Recording Secretary, H. W. Solt, Bethlehem; Corresponding Secretary, W. Richards, Slatington; Financial Secretary, H. A. Jelly, Allentown; Executive Committee, W. M. Skinner, Phillipsburg, N. J.; H. P. Feldman, Bethlehem; C. S. Henry, Allentown.

NEW YORK STATE DENTAL SOCIETY.

The annual meeting of the Dental Society of the State of New York will be held at Albany, May 12-13, 1905. Papers will be read by Drs. E. T. Darby, Philadelphia; S. G. Perry, New York; J. P. Buckley, W. T. Reeves and A. H. Peck, of Chicago. The clinic committee, of which Dr. F. W. Proseus, Rochester, is chairman, is hard at work arranging an interesting program. A large attendance is expected.

W. C. DEANE, Secy., New York.

LEWIS AND CLARK DENTAL CONGRESS.

The Lewis and Clark Dental Congress will be held at the Lewis and Clark Centennial at Portland, Ore., July 17-20, 1905. The Fair will not detract from the meetings, as the sessions will be held two miles from the Fair grounds, in a hall capable of holding 5,000 people, where there is ample provision for meetings, clinics and exhibits. There will be three days of clinics, the papers being usually read in the evening, and a clinical program of unusual variety and interest is assured. Membership in the Congress is unlimited, except that each applicant must have subscribed to the code of ethics. Dentists residing in that territory must secure the recommendation of the general committee, but those living elsewhere may send their applications direct to the secretary, together with the fee of $5. This will be an excellent opportunity for those living east of the Missouri River to visit the Pacific Coast, as the round trip from Chicago will cost only $56.50. Tickets are good for 90 days, and the purchaser may select the route both ways. A cordial invitation is extended to the entire dental profession to meet with them, and the co-operation of eastern men is solicited. The dentists of the west have always done their full share in making eastern meetings a success, and the dentists of the east should now recognize their opportunity to repay the obligation.

News Summary.

E. L. BROOKS, a dentist at Vinton, Ia., died Jan. 19, 1905.

J. R. CLAYTON, a dentist at Shelbyville, Ky., died Jan. 13, 1905.

D. MACKELLAR, 29 years old, a dentist at Detroit, died Jan. 6, 1905.

D. N. SCHUMACHER, 75 years old, a dentist at Denver, died Jan. 15, 1905.

L. F. MCLAUGHLIN, a retired dentist at Americus, Ga., died Jan. 9, 1905.

E. F. JACQUES, 51 years old, a dentist at Painesville, O., died Jan 18, 1905.

MORITZ LEWKOWITZ, 54 years old, a dentist of Brooklyn, died Jan. 2, 1905.

GEORGE N. BOWMAN, a retired dentist at Pottsville, Pa., died Jan. 3, 1905.

S. B. LADD, 83 years old, a retired dentist of Philadelphia, died Dec. 19, 1904.

S. T. FELSENTHAL, 36 years old, a dentist at Louisville, Ky., died Jan. 11, 1905.

WM. T. BAILEY, 76 years old, a dentist of Binghamton, N. Y., died Jan. 7, 1905.

FRANK C. BROWN, 84 years old, a dentist of Palmyra, N. Y., died Jan. 3, 1905.

ROBERT COY, a dentist of Chicago, was killed by Indians in Mexico, Jan. 19, 1905.

FORDYCE CHAPMAN, a dentist at Parkersburg, W. Va., dropped dead Jan. 7, 1905.

GEORGE MILTON, a dentist of Denver and Pagosa Springs, Colo., died Jan. 18, 1905.

GEORGE E. KNOX, 76 years old, a retired dentist at Ballston, N. Y., died Jan. 8, 1905.

F. H. GATES, a dentist of Norton, Kan., died suddenly of heart disease Jan. 20, 1905.

J. B. WILCOX, a dentist at Manistee, Mich., was killed Jan. 18, 1905, by the kick of a horse.

F. P. MATHER, 61 years old, a dentist at Chester, Vt., died Dec. 29, 1904, of Bright's disease.

J. S. NICHOLSON, a dentist at Centre Point, Ia., died Jan. 14, 1905, from a stroke of apoplexy.

J. A. SMALLEY, 49 years old, a dentist at Newark, N. J., died Jan. 8, 1905, of Bright's disease.

R. DE LA NEUVILLE, 25 years old, a dentist of Holyoke, Mass., committed suicide Jan. 1, 1905.

B. A. MCGEE, 53 years old, a dentist at Denver, died suddenly from heart disease Jan. 15, 1905.

STUNT FOR A GENEALOGIST.—A genealogist received recently a letter from a lady who wants to join the Colonial Dames. It began: "I want to ask your assistance in looking up my posterity."—*San. Era.*

C. M. COBB, a dentist of St. Joseph, Mo., died at Clear Lake, Ia., Jan. 4, 1905, of consumption.

B. W. LEONARD, 52 years old, a dentist at Westbrook, Conn., died suddenly of heart failure Dec. 18, 1904.

J. F. HENDRICK, a dentist of Bowling Green, Ky., was stricken with paralysis Jan. 29, 1905, and his condition is serious.

A. H. SYLVESTER, dentist to the German Emperor, committed suicide in Berlin, Jan. 10, 1905, at the age of 60 years.

THRUSH.—Illoway reviews some of the dangers that may follow neglect in the treatment of thrush. Nothing gives such brilliant results as a twenty-five per cent solution of the tincture of iodin in glycerin.—*N. Y. Med. Jour.*

THE LIMIT.—Sweet Young Thing (in bathing suit)—"Surely, Aunt Margaret, you're not going to wear your spectacles in the water?" Aunt M.—"Indeed, I am. Nothing shall induce me to take off another thing."—Cincinnati *Commercial Tribune.*

REDUCTION OF FRACTURES.—When a fracture cannot be perfectly reduced and the parts brought into good approximation, it is pretty nearly malpractice to be satisfied with our efforts until we have tried anesthesia to the full surgical degree.—*Intern. Jour. of Surg.*

NEURALGIA DUE TO DENTAL IRRITATION.—Lederer reviews the various diseased conditions of the teeth that are capable of giving rise to neuralgia. He reports one case of cervico-brachial neuralgia which was due to a pulpitis of the lower second molar.—*N. Y. Med. Jour.*

GINGIVITIS.—If you fail to cure a case of gingivitis or kindred disease, place the rubber dam over the teeth involved and mechanically and chemically clean all the surfaces at the point of infection. By adopting this method success will crown your efforts.—C. R. TAYLOR, *in Review.*

MUSICAL DENTIST FINED.—Jan. 26, a dentist in Paris, France, was fined for using music while extracting teeth, on the ground that such a specific was not contained in the pharmacopeia. It was shown that when the music failed to bring insensibility the dentist resorted surreptitiously to nitrous oxid.

BULLET IN JAW.—According to newspaper report, a dentist in Kansas recently found a bullet embedded in the jawbone of a Civil War veteran for whom he was doing some work. The veteran was shot in 1864, but it was thought at the time that the bullet had gone through the jaw without lodging.

WILL SWAP TEETH FOR CHICKENS.—Jan. 9, a man at Petersburg, Ind., found that several of his finest chickens were missing, while on the floor of the hen house was a set of false teeth which a local dentist identified as belonging to a woman in the town. The farmer says he is willing to exchange the teeth for the chickens.

MOUTH-BREATHING.—Mouth-breathing may be largely counteracted by the development of the muscles of mastication, which in the time of sleep will keep the jaws closed, while weak muscles, which are never used in mastication, constantly relax during sleep and the mouth is bound to drop open.—FRED B. NOYES, *Review.*

PULP MUMMIFICATION.—I never mummify a pulp that comes to me in any other condition than freshly exposed. Some try to mummify pulps that are diseased, pulps with pulp stones, teeth that are loose in the socket; that is where the failures come in. The pulp must be in comparatively a healthy condition.—DR. WAAS, *Items.*

USES OF CEMENT.—As a cavity lining, for purposes of anchorage to secure perfect adaptation, as a non-conductor, to strengthen frail walls, to prevent discoloration from amalgam, to avoid cutting for retention in sensitive dentin, to prevent shrinkage of amalgam from cavity walls, and to save time for both patient and operator.—J. J. REED, *Brief.*

A WISE PRECAUTION IN OPERATIONS UNDER LOCAL ANESTHESIA.—Do not let your patients see an operation that you are doing upon them under local anesthesia, and then ascribe their fainting to the cocain. Remember also that men, however strong they may look, are more apt to faint at the sight of blood than are women.—*Intern. Jour. of Surg.*

FIRES.—J. M. Cartwright, East Liverpool, O., Dec. 20, loss $200.—S. W. Burke, Meadville, Pa., Jan. 9, loss $400, no insurance.—F. V. Smith, Woodville, Tex., Jan. 16, loss $1,000, insurance $400.—E. W. Knight, Bellows Falls, Vt., Jan. 4, loss $12,000, insurance $5,000.—N. W. Emery, N. Fond du Lac., Wis., Jan. 10, loss $1,000, insurance $200.

IMMUNE TO CARIES.—The mouths which become immune to decay are chiefly those which are used vigorously, and the worst mouths we have to deal with are the ones in which the food is simply patted about and then swallowed. The importance of training patients to use their teeth cannot be too strictly emphasized.—FRED B. NOYES, *Review.*

TO PREVENT RUBBER DAM LEAKING.—It will sometimes be found that after applying a clamp to a lower molar for retaining the rubber dam the saliva will work up past the dam and endanger the operation. This may frequently be prevented by packing a small roll of cotton between the jaw of the clamp and the dam, thus holding the dam tight against the gum.—*Review.*

NOTHING IN SIGHT.—An old man called on Dr. M. C. Smith of Lynn, Mass., a short time ago and stated that he understood Mrs. Blank had been to the Doctor to see if he would not settle for a hemorrhage she had one night after having had a tooth extracted. He wanted to know if the Doctor had promised her anything or if she was going to sue, for if she was he would like to get an attachment on the judgment, as her husband owed him some money. As the Doctor had stayed up all of one night to save her life he did not think he would settle.

ROOT-CANAL FILLING.—For a canal which has been difficult to open my choice is gutta-percha, since I feel sure I can reach the apex with it. Select a point longer than the canal, which cannot be pushed quite to the apical opening, and place it in the canal; dip the foil carriers in oil of cajuput and carry the drop which they will hold to the orifice of the canal; it will instantly run in. Catch the projecting gutta-percha and move it up and down; friction aided by the solvent action of the oil will make the point fit the canal accurately.—JAS. M. MAGEE, *Dominion.*

TREPHINING WITH LOCAL ANESTHESIA.—Heidenhain has operated upon two patients—removing in one instance a sequestrum, in the other trephining for a sarcoma of the motor region—under local anesthesia, using Braun's solution, a one-half of one per cent solution of cocain with the addition of one or two drops of a one-tenth of one per cent solution of adrenalin.—*N. Y. Med. Jour.*

FOREWARNED.—"Lukka yere, Hezekiah, chile," said a fond Clark street colored mother, "Wen yer go 'roun' pickin' up chips an' trash ter bu'n, doan yer go anigh dat ar dentus collidge, fer dars war dey gits peepul un cuts 'em all up ter mek medsin outen. De students git yer sho ef yer doan keep yer eyes skint an' git er ortomobile move on yer. Yer yere me, chile?"—J. F. STEELE, *in Hints.*

PULP REMOVAL IN THE TREATMENT OF PYORRHEA.—In pulp removal in so-called sound teeth, as a measure of treatment in pyorrheal mouths, three obstacles to success may be encountered. First, there is great probability of pulp calcification; second, hemorrhage is a common sequence; and third and most important, the socket being already in an infected condition apical abscess is a not improbable sequence.—R. OTTOLENGUI.

DIVORCES.—N. W. Hanson, a dentist of Des Moines, Ia., was sued Jan. 28 for divorce by his wife.—Jan. 27, J. R. Hanley, a dentist of Bay City, Mich., began divorce proceedings against his wife.—Jan. 28, Mrs. Agnes Houser of Taylorville, Ill., was granted a decree of divorce from her husband, W. S. Houser, a dentist, on the ground of cruelty.—Dec. 27, Thos. B. Key, a dentist of Fresno, Cal., brought suit for divorce against his wife.

TO DETERMINE THE SHADE OF FACINGS.—Keep on hand a small piece of plate gold, with a slot cut through it large enough to admit the pins of the facing. When selecting a facing place the gold in position on the back and note the change in color produced by it. The edges of the gold should not extend beyond the edges of the facing. If platinum is employed for backing a thin piece can be prepared in the same manner.—R. L. GRABER, *in Review.*

DENTIST A MECHANIC.—Jan. 5, a judge at Nashville, Tenn., had to decide the status of a dentist. The case grew out of a dentist having his instruments levied upon. He replevined them, and the man who made the original levy insisted that they did not come under the exemption—"necessary in the pursuit of trade"—as is the case with a mechanic's tools, but the judge decided that a dentist was a mechanic and that his tools were consequently exempt.

OBTAINING SEPARATION.—To obtain separation for the placing of bands in tooth regulation, force over the teeth to be banded unannealed German silver bands made from seamless tubing of gauge 36; allowing them to remain until the following sitting will provide sufficient space painlessly for placing in position annealed bands of the same size fitted over the teeth on the plaster model in the construction of the appliance. Time is saved, accuracy is obtained, and the unnecessary annoyance to the patient consequent upon the usual methods of separation is avoided.—S. H. GUILFORD, *Items.*

PULP REMOVAL; PRESSURE ANESTHESIA.—If the apical foramen is small and a free opening made before attempting removal, if the broach is gently slipped to the very apex and the pulp heroically removed, there will be very little bleeding, and what may occur will soon cease of its own accord, and then by washing out canals with alcohol and drying we approach nearer the ideal condition than can be attained by any other method.—R. A. ADAMS, *Summary.*

MARRIAGES.—Emile J. Arcand, a dentist of Fall River, Mass., was married to Miss Sylvianna E. Nadeau of Fall River, Jan 9, 1905.—W. H. Hanning, a dentist of Lafayette, Ind., was married to Miss Florence Winkler of Huntingburg, Ind., Dec. 21, 1904.—J. T. Hardy, a dentist of Ontario, N. Y., was married to Mrs. Florence Reed of Lebanon, Pa., Jan. 28, 1905.—J. M. Tipton, a dentist of East St. Louis, Ill., was married to Miss Nancy L. Rodman of Hatton, Mo., Jan. 20, 1905.

DENTIST NOT RESPONSIBLE FOR LOSS.—Last month a judge in the First District Court at Newark, N. J., handed down a decision which is of interest. A woman took a set of false teeth to a dentist to be repaired. While in his hands they disappeared, and according to the court's decision the inference was that they had been taken by an employe. The woman sued to recover the value, but the court held that the dentist had used all due care and was not responsible for their loss.

BANKRUPTS.—Jan. 4, John M. Blake, a dentist of Helena, Mont., filed a petition in bankruptcy, giving his liabilities at $1,087 and his assets at $227, claiming the latter to be exempt.—Dec. 23, 1904, E. S. Riggs, a dentist of Brooklyn, filed a petition in bankruptcy. He gave his liabilities as $4,716 and his assets as $1,889.—Jan. 27, Henry M. Stone, a dentist of Newburyport, Mass., was arrested charged with filing false schedules in connection with his bankruptcy in December, 1903.

INFORMATION WANTED.—We recently received the following letter from an individual in a little town of New Jersey: "Please tell me about filling. I had tooth crowned and now face is swollen and leaves dimple in side of face and dentist says tooth must be taken out as thinks nerve is not dead and I heard it can be saved and so write and ask you the very best man to attend to this you know in this part of country and can tooth be saved. Also tell me very best dentist who fills teeth and oblige."

ACHING PULPS IN TEETH ALREADY FILLED; PROGNOSIS.—A pulp aching and covered by a filling may be considered as a morbid tissue and prognosis will depend upon the conditions found on removal of the filling. It is important to carefully note the first exudation from the pulp as it is uncovered. If a drop of pus should escape it shows that infection is already present and pressure anesthesia should not be attempted at the first sitting; instead a dressing which will be both sedative and antiseptic in character should be applied. Usually the escape of pus and the slight hemorrhage alleviate the suffering, and with the antiseptic treatment the forcing of septic material through the apex is avoided. When there is no pus prognosis should be favorable.—R. OTTOLENGUI.

RESPECT FOR THE DEAD.—"The trouble," said the dentist, as he probed away at the aching molar with a long, slender instrument, "is evidently due to a dying nerve."

"Well," groaned the victim, "it's up to you to treat the dying with a little more respect."—*Chicago News.*

EXTENSION FOR PREVENTION OR FOR RETENTION?—I believe the matter of extension for retention is of subordinate importance. Extension for prevention is the keynote of the problem. In extension for prevention we always have greater stress, but we know that many times when we have made extension for prevention without the thought of retention, we have had much better success in saving the tooth than we have when we have made the extension for retention and not for prevention.—E. O. FRENCH, *Summary.*

FETID BREATH.—

℞. Infusion sage, 250 gm.
Glycerin (pure), 30 "
Tinct. myrrh,
Tinct. lavender, of each 12 "
Labarraque's solution, 30 " M.
Sig.—Mouth-wash, as required.

When due to gastric fermentation, wood charcoal in dose of 10 grains every three hours.—*Monthly Cycl. of Prac. Med.*

DISENCHANTED.—The just-come dentist, a dashing fellow, happening to see a handsome girl, most becomingly gowned, and withal good to look upon, bethought him how she might be made to include herself as one of his limited but growing clientele, and to that end planned for an introduction. The hospital fair supplied the opportunity, and to the dinner he hied him without delay. They met; he awaited her; she waited on him. When the final course was due she asked: "Dessert, Doctor?" "Yes, please." "Pie or Pud?"—*D. O. & L.*

FORCED.—

There was a fair maiden of Siam,
Who said to her lover, "O Priam,
You may kiss me, of course,
But you've got to use force—
And God knows you are stronger than I am!"

ILLEGAL PRACTITIONERS.—Jan. 20, five dentists in Los Angeles were arrested for practising without a license. One or two of them were old offenders, and it had been impossible previously to obtain evidence against them, but the board found a man who was willing to have his teeth pulled or filled if necessary, and through his evidence the offenders were caught.—Jan. 13, a man at Toronto, Can., was fined $20 for practising dentistry without a license.—Jan. 16, a man at Nashville, Kan., was fined $25 and costs for practising dentistry without a license.—Dec. 27, 1904, a dentist in New York was fined $150 for practising without a license. He was convicted for the same offense in 1902.—Dec. 27, 1904, the proprietor of a painless dental parlor in New York was

fined $50 for violating the dental law. Two of the employes were also convicted, but their sentences were suspended.—Dec. 21, 1904, the proprietor of a dental parlor at Coshocton, O., was arrested for practising without a license.

ADRENALIN-COCAIN.—An adrenalin solution of cocain, on a roll of cotton, on the floor of the nose opposite the ends of the roots of the superior incisors and cuspids, makes possible the painless extraction or cavity preparation of all the anterior teeth. As a working formula:

℞. Acidi borici, gr. iv;
Cocain hydrochlor., gr. xxiv;
Adrenalin chlor., gtt. xxiv;
Aquæ dest. q. s., oz. ss.

O. A. LA GRONE, *Dental Office and Laboratory.*

BANDLESS PORCELAIN CROWN.—The article in the December DIGEST on "The Bandless Porcelain Crown" by Dr. R. A. Pritchett interested me, as I agree with him. My method of setting the crown is an improvement on cement alone. When the crown is fitted to the root and properly shaped, take a small portion of temporary stopping, heat and mould around the base of the post, press the crown to place, remove and dress off surplus, reheat and return to position, allow to cool, remove again, trim off any surplus, also any extending into hole in root, and cement to place. The temporary stopping is insoluble and seals the cement, preventing the fluids of the mouth from disintegrating it.—*John G. Harper,* St. Louis.

ROBBERIES.—J. V. Sayler, a young dentist of Enid, Okla., was robbed in Los Angeles, Cal., by footpads Jan. 27, losing about $40 and being severely injured.—W. A. Sherman, Storm Lake, Ia., Jan. 9, $125.—F. N. Bingham, Des Moines, Ia., Jan. 26, $300.—H. C. Stokes, Lexington, Mo., Dec. 13, $15.—J. C. Wherritt, Joplin, Mo., Jan. 12, $15.—V. H. H. Filkins, Passaic, N. J., Dec. 29, $300.—Jan. 7, a negro boy in Brooklyn was arrested for robbing the pocketbooks and overcoats of patients who came to his employer's office.—F. T. Simmons, Utica, N. Y., Jan. 1, $15.—H. M. Clapp, Utica, N. Y., Jan. 1, $25.—D. McKenzie, Brooklyn, Jan. 18, $300.—H. A. Evans, Wilkesbarre, Pa., Jan. 1, $100.—Jan. 9, Drs. R. G. Covode, Henry Hinchman, A. T. Jerrett, F. O. Logan and Frank Geer, all of Johnstown, Pa., were robbed of gold and material aggregating about $250.—J. B. Watt, Norristown, Pa., Jan. 25, $50.—R. M. Schaffer, Easton, Pa., Jan. 23, $60.—C. R. Scholl, Reading, Pa., Jan. 7, $60.

DEFINITIONS FOR "SEPSIS," "ASEPSIS," "ANTISEPSIS," "DISINFECTANT," "GERMICIDE."—By the term sepsis we understand the existence of a condition in which bacterial infection with its sequellæ, fermentation or putrefaction is brought about by the presence of germs or their products, while asepsis implies entire freedom from such infection, namely, a sterile condition. If a primary septic condition is changed by some method or means which inhibits the growth of putrefactive organisms antisepsis is secured. Consequently antiseptics are chemical agents which merely inhibit the action of bacteria, while germicides destroy the vitality of the infective organisms. On the other hand, disinfectants chemically change the poisonous products of the

bacteria to some inert compound without necessarily killing the organisms. Thus it will be seen that an antiseptic is not necessarily a germicide or a disinfectant; thus glycerin will inhibit the growth of certain bacteria and is therefore antiseptic, but it has little or no power to destroy the bacteria themselves or their spores, and consequently possesses no germicidal or disinfective properties.—HERMANN PRINZ, *Review.*

MAXILLARY SINUSITIS DUE TO A DENTAL ECTOPIA.—Guizez reports a case in which the suppuration of the maxillary sinus was found to be due to a large molar tooth in its interior, the roots being implanted partly in the alveolus and partly in the floor of the sinus itself. This tooth was carious at the union of the neck and roots. For its liberation it was necessary to resect a portion of the alveolar process and the palatal vault. A slight buccal fistula presented for several weeks, but the purulent discharge and the subjective odor completely disappeared.—*Amer. Jour. of the Med. Sc.*

SINS OF FATHER VISITED ON SON.—An Edinburgh lawyer was given to swearing. One night his small boy was sitting by him, studying arithmetic. The father broke out, "What on earth ails you. Why can't you sit still—wriggling and writhing every minute?"

"It's all your fault," blubbered the boy.

"Why is it?"

"Cos I asked you last night how much a billion was and you said it was 'a d—— lot.' The teacher asked me the same question to-day, and I said the same thing. And that's why I can't keep still."

ABORTING ALVEOLAR ABSCESS.—A prolific source of septic pericementitis is escaping microorganisms and ptomaines from putrescent root-canals, but in many instances abscesses may be prevented by the use of proper remedies at the proper time. The first duty is to open the canal and let the confined gases escape. Both the tooth and the infected peridental membrane require treatment. To aid nature in readjusting the abnormal condition the following prescription will prove useful:

℞. Potassii iodidi, ʒi;
Syrupi sarsaparillæ comp., fʒiii. M.

SIG.—Take a teaspoonful three times a day after meals.

The teaspoonful may be added to half a wineglassful of water to further dilute the potassium iodid.—J. P. BUCKLEY, *Review.*

ACCIDENTS.—Last month the vulcanizer in the office of a dentist at Greenville, Ind., exploded and the pieces went all over the room. The dentist was sitting near by, but fortunately escaped injury.—This month a farmer at Hartford City, Ind., almost bled to death following the extraction of a molar.—This month a minister at Louisville, Ky., swallowed a bur which became loosened from the handpiece. Physicians are trying to locate it with the X-ray, but thus far have been unsuccessful.—This month a man at Kalamazoo, Mich., almost died from blood-poisoning brought on by the extraction of a tooth, but it is thought that he is now out of danger.—Henry W. Kiess, a dentist of St. Louis, was severely injured in a collision between his carriage and a street car this month.—G. E. Mann and S. E. Gates, dentists of Cin-

cinnati, were severely injured this month by the explosion of a vulcanizer in their office. They were working near it at the time, and so received the full force of the explosion. Both were badly burned, and each may lose the sight of one or both eyes.—This month a woman at Elizabeth, N. J., suffered so severely from toothache that she became unconscious and remained so for twenty-four hours, finally being relieved by the extraction of the tooth.

FATALITIES.—Jan. 3, a man died in a dentist's chair at Sacramento while a physician was administering chloroform previous to the extraction of a tooth.—Jan, 24, a woman, 50 years old, died suddenly from heart failure while sitting in a dentist's chair at Buffalo.—Dec. 25, 1904, a man died at Binghamton, N. Y., as the result of extraction of a tooth. Some weeks ago he had a tooth pulled and the wound never healed. It finally became so painful that physicians advised an operation, and while under the influence of ether an artery gave way and he died almost immediately.—Jan. 17, a young man at Mahanoy City, Pa., had two teeth extracted. Hemorrhage resulted, other complications set in, and he died in twenty-four hours.—Jan. 20, a boy died in a dentist's chair at Connellsville, Pa., after the extraction of a tooth.

EXAMINING BOARD AFFAIRS.—At the December meeting of the California Board 13 out of 30 applicants were successful in passing the examination. The board elected officers as follows: President, F. G. Baird, San Francisco; Secretary, C. A. Herrick, Jackson; Treasurer, E. G. Howard, Los Angeles.—Jan. 10, the commissioners accepted the resignation of W. E. Dieffenderfer as a member of the District of Columbia Board, and appointed Sheldon G. Davis to fill the vacancy.—Jan. 20, the Idaho Board was sued by two dentists, who seek to compel the board to issue certificates to them.—Jan. 9, the Governor appointed Alexander Jameson as a member of the Indiana Board to succeed W. L. Stine, who died last month.—Jan. 27, the Governor appointed F. G. Eddy and W. S. Kenyon as members of the Rhode Island Board to succeed R. L. Davis and D. F. Keefe.—At the last meeting of the New Hampshire Board six applicants were successful in passing the examinations.

DAMAGE SUITS.—The Superior Court of California decided last month against a dentist. He sued the proprietor of a drug store for $5,000 damages, alleging that he ordered a bottle of still water, but was given a bottle of highly charged water, and that the bottle broke and cut one of his hands, impairing the use of it. The court decided that the defendant was not responsible for the accident.—The Supreme Court of California last month affirmed the judgment of the Appellate Court in assessing $2,000 damages against a dentist, for injuries resulting from the alleged unskilful extraction of a woman's tooth.—A woman in St. Louis has sued a dental college for $10,000 damages, alleging that while having a tooth filled at the college one of the operators drilled through the root, injuring her gum so that she was unable to attend to her duties.—This month a man at Croton, O., sued a dentist for $200 damages, alleging that the dentist dislocated his jaw while extracting a tooth. The jury found no cause for action and the case was dismissed.—

This month a woman at Bayonne, N. J., swore out a warrant for a dentist, alleging assault. She claimed that because she did not have sufficient money with her to pay the small balance due on her account the dentist refused to allow her to go or to send for the money and removed a bridge which he had just set in her mouth.—This month a dentist in Philadelphia was sued for $1,000 damages by a man who claimed that the dentist extracted a tooth in such an unskillful manner as to seriously injure his jaw.—This month a dentist at Memphis, Tenn., was fined $25 and costs for removing a gold crown from a woman's mouth because she did not have money enough with her to pay the balance due on it.

THE DOCTORS' PROMISED LAND.—

Tell me, ye winged winds
That round my pathway play,
Is there no place on earth
Where doctors get their pay?
The whispering winds went by
With accents filled with woe;
A voice borne on the morning air
In sadness answered "No."

Tell me ye flowing streams
That smoothly glide along,
Is there no cherished place
Where doctors meet no wrong?
The gentle brook replied
In murmurs soft and low,
And wending on its verdant way
It meekly answered "No."

Tell me, ye murky clouds
Now rising in the west,
Is there upon the globe
One spot by doctors blessed?
The flushing clouds outspoke
With an indignant glow;
A voice that filled the earth with awe
In thunders answered "No."

Tell me, angelic host,
Ye messengers of love,
Shall suffering doctors here below
Have no redress above?
The angel band replied:
"To us is knowledge given;
Delinquents on physicians' books
Can never enter heaven."

J. B. MITCHELL, *Medical W*